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UNITED STATES DEPARTMENT
OF COMMERCE

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BIBLIOGRAPHY OF SCIENTIFIC AND INDUSTRIAL REPORTS

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Because the *Bibliography* is now being published on a monthly basis, the Office of Technical Services recognizes an increased need on the part of its readers for reference service. Your inquiries are invited. Write to the Reference Service, Room 1325 Department of Commerce Building, Washington 25, D. C., or telephone STerling 9200 (Government Agencies call Code 164), Ext. 3631.

ERRATA:

PB 92826 BROWN, F.W. and WILLOUGHBY, A.B.
Optical method determining thickness of Geiger tube windows. 1948.
(Bib. v.10, p.473) Changed to PB 92825.

PB 93769 U. S. NAVAL ORDNANCE LABORATORY.
Papers presented at the Magnetic Materials Symposium. (Bib. v.10, p.508)
Limited supply mimeograph $1.50.

PB 31874s WRIGHT, BYRON T. and RICHARDSON, J. REGINALD
Frequency modulated cyclotron characteristics.
(Bib. v.10, p.233) Changed to PB 95792.

APPAREL

PB 94860

Henry, James P. and others.
Evaluation of the anti-G suit. Jul 1948. 18p graphs, tables Mi $1.75 Ph $2.50
I. Suits, Anti-blackout

PB 94713

U. S. Air Force and U. S. Navy Dept.
Gloves: Flying, inner, intermediate, nylon. Air Force-Navy aeronautical specification. Sep 1948. 6p table Mi $1.25 Ph $1.25
I. Gloves, Nylon

PB 94712

U. S. Air Force and U. S. Navy Dept.
Gloves: Flying, inner, intermediate, wool. Air Force-Navy aeronautical specification. Sep 1948. 7p tables Mi $1.25 Ph $1.25
I. Gloves, Wool

PB 94715

U. S. Air Force and U. S. Navy Dept.
Gloves: Flying, intermediate. Air Force-Navy aeronautical specification. Sep 1948. 8p tables Mi $1.25 Ph $1.25
I. Gloves, Flying

PB 94859

Walker, W. C.
Electrically heated clothing: Aircraft mechanics. Jul 1948. 29p photos Mi $2.00 Ph $3.75
I. Clothing, Flying—Electrically heated

CHEMICALS AND ALLIED PRODUCTS

Plastics and Plasticizers

PB 94519

Turner, P. S.
Problem of thermal-expansion stresses in reinforced plastics. Jun 1942. 29p graphs, tables Mi $2.00 Ph $3.75
Failure of adhesive bonds is attributed to boundary stress concentrations. An analysis of the causes of internal-stress concentrations in rigid adhesive layers leads to the conclusion that stress concentrations can be eliminated in many cases by matching the coefficients of thermal expansion of the component parts. A stress-equilibrium formula for calculating the thermal-expansion coefficients of mixtures involves the density, modulus of elasticity, coefficient of thermal expansion, and proportion by weight of the ingredients. Illustrations of the application of the formula derived include lead-antimony and beryllium-aluminum mixtures, phenol-formaldehyde resin and glass-fiber mixtures, and plastic plywoods. The thermal-expansion coefficients of a number of pure and reinforced plastics are reported. Bonds obtained when thermal coefficients are matched are stable over a wide temperature range. NACA W-36.

Paints, Varnishes and Lacquers

PB 94354

Braslow, Albert L.
Investigation of effects of various camouflage paints and painting procedures on the drag characteristics of an NACA 65(421)-420, a = 1.0 airfoil section. Jul 1944. 18p graphs, tables Mi $1.75 Ph $2.50
The effects of various camouflage paints and painting procedures on the drag characteristics of a 60-inch-chord low-drag airfoil have been investigated in the NACA two-dimensional low-turbulence pressure tunnel. A typical field application of camouflage paint increased the section drag coefficient of the aerodynamically smooth airfoil at a Reynolds number of 44×10^6 from 0.0046 to 0.0079 at a section lift coefficient of 0.3 and from 0.0053 to 0.0086 at a section lift coefficient of 0.7. For a camouflage painted surface unimproved after painting, increased care taken in the application of the paint resulted in an increase in the maximum Reynolds number at which low drag coefficients were obtainable. This maximum Reynolds number did not exceed 22×10^6 for any of the surface conditions tested unless the surfaces were lightly sanded after painting. In order to approach the drag characteristics of the aerodynamically smooth airfoil section at high-speed and cruising lift coefficients and flight Reynolds numbers, it was necessary to sand the airfoil surfaces lightly after painting. NACA L-141

Analytical Chemistry

PB 94813

Enkvist, Terje
Undersökningar Rörande Talloljebeck. 1947. 7p tables (Text in Swedish) Mi $1.25 Ph $1.25
Abstracts in English and German.
Svenska Träforskningsinstitutet. Träkemi och Pappersteknik. Meddelande 25
Samples of tall oil pitch from various plants were found to have very different compositions. Pitch from the plant of Sandarne contained only about 10% of common ether soluble fatty and resin acids. The remainder is a fairly complicated mixture, containing i.a. difficultly saponifiable resin acid and higher fatty acid esters (waxes), oxidized and condensated resin and fatty acids, more or less decomposed sterols, and about 10% of matter containing methoxyl and probably of lignin or resin phenol origin. The bulk of the readily esterifiable acids of the pitch is in no wise composed of ordinary fatty acids, but behaves as if it contained addition products of resin acids molecules to fatty acids, where the carboxyl group of the resin acids is bound with the formation of a difficultly

saponifiable ester. Pitch from the plant of Kalix is less decomposed, whereas pitch from Marma seems to take a middle position in this respect. To judge from sizing experiments with isolated parts of pitch from Sandarne, it is the resin acids which are principally active in the preparation of size for kraft paper and wallboard. The readily esterifiable acids of the pitch impart poor sizing strengths. Distillations of crude tall oil carried out at pressures of only about ½ to 2½ mm showed that it seems to be possible to diminish the yields of pitch from a common value of about 25-35% to only 16% or even less without decomposing the pitch to any appreciable degree. The yield of pitch can be diminished to only 8% by distilling still further, but then the pitch assumes a high melting point and a great part will be insoluble in organic solvents, and the last fraction of the distillate contains so much unsaponifiables that it cannot well be mixed with common distilled tall oil

see errata sheet, v. 11, #2 96655

PB ~~90414~~

Gt. Brit. Dept. of Scientific and Industrial Research.

Methods for the detection of toxic gases in industry, Leaflet No. 3—Sulphur Dioxide. Oct 1938. 11p photos, drawings Available from British Information Services, 30 Rockefeller Plaza, New York 20, New York $1.00

1. Sulfur dioxide—Detection—Gt. Brit. 2. DSIR L3

PB 94818

Johansson, Axel

Analys av acetyleringsreagens. 1947. 3p tables (Text in Swedish) Mi $1.25 Ph $1.25

Abstracts in English and German

Svenska Träforskningsinstitutet. Träkemi och Pappersteknik. Meddelande 30

Rapid methods have been developed for determination of water in acetic acid, and for determination of the anhydride content of acetic anhydride. The determination of water was performed by a modified *Karl Fischer*-titration. The anhydride content was calculated from the difference between the quantities of acetic anhydride obtained by reacting the sample with water and with methanol respectively. In these reactions pyridine was used as a catalizing agent.

Miscellaneous Chemicals

PB 94800

Adler, Erich

Om sockersulfonsyror, deras bildning vid sulfitprocessen och deras konstitution. 1947. 8p diagrs, graphs (Text in Swedish) Mi $1.25 Ph $1.25

Abstracts in English and German

Svenska Träforskningsinstitutet. Träkemi och Pappersteknik. Meddelande 12

In the sulphite cooking process it is not only the lignin which reacts with the bisulphite and the cooking acid, but also to some extent the hemicellulose. The reaction between the hemi-cellulose or the sugars formed by hydrolysis and the bisulphite does not cease with the formation of the labile sugarbisulphite addition compounds but can also carry on to more complete irreversible conversions which result in a loss of fermentable sugar. The chemical process causing this destruction of sugar is not as yet completely clear. It is known that to some extent it is caused by an oxidation of aldoses to aldonic acids. It seems probable, however, that also a formation of relatively stable nonfermentable »sugar sulphonic acids» takes place. The mechanism of this reaction and the chemical constitution of the sulphonic acids thus formed is still very unclear and it is the purpose of these investigations to look into these questions. While the heating of glucose with cooking acid of a low content of lime results only in the formation of gluconic acid, a similar treatment of holo-cellulose resulted in the formation of aldonic and sulphonic acids. As much as 15-30% of the sugar destroyed during the sulphite cook could be identified in the form of stable sulphonic acids. In order to obtain more information regarding the chemical nature of the »carbohydrate sulphonic acids» a study was made of the »glucose sulphonic acids», earlier obtained by Hägglund, Johnson and Urban by heating glucose with sodium sulphite at a pH-value of 5. It was now shown that this consisted of 2 sulphocarbonic acids (acid A and B), one of which (acid A) contains an aldehyde group. The composition of a few salts and derivatives obtained in cristalline form and the result of oxidation with per-iodic acid furnished valuable information regarding the constitution of these substances. When final evidence has been obtained, the processes taking place in the formation of sulphonic acids during the technical sulphite cooking will be more readily understood.

PB 94804

Adler, Erich

Über die lose gebundene schweflige säure der sulfitablauge. I. Ihr verhalten bei der neutralisiefung der sulfitablauge und ihre aldehydbisulfitnatur. 1947. 6p graphs (Text in German) Mi $1.25 Ph $1.25

Abstracts in English and Swedish

Svenska Träforskningsinstitutet. Träkemi och Pappersteknik. Meddelande 16

The loosely combined sulphur dioxide in sulphite waste liquor is of interest in connection with the neutralization and fermentation of the liquors and in connection with their evaporation since it is a potential source of incrusts in the form of calcium sulphite. In this paper an account is given of some preliminary work with a view to illustrate the chemical nature of the substances in the sulphite

waste liquor which bind the sulphur dioxide in the loosely combined form. The liberation of the loosely combined sulphur dioxide when neutralizing sulphite waste liquor with chalk has been studied under standard conditions. It appears that when neutrallizing to a pH-value =6 and at about 100° C only a part of the loosely combined SO_2 of the acid liquor can be split off. The remaining fraction is resistant to chalk and does not split off until the value of pH is raised to above 7. A simple reason is given to explain the difference existing between waste liquors from strong pulp and rayon pulp with regard to their content of loosely combined SO_2 and also to explain the difficulties encountered in neutrallizing waste liquors from strong pulp. In order to characterize the loosely combined sulphite more definitely, its liberation at different values of pH and at 20° C has been studied. The effect of the pH on the decomposition and the reversibility of this process confirm earlier concepts especially lanced by Kerp, that the loosely combined sulphur dioxide in sulphite waste liquor exists in the form of carbonyl bisulphite addition compounds.

PB 95682

Clusius, Klaus and others.

Physical chemistry. (FIAT Review of German Science 1939-1946). 1948. 270p (Text in German) Mimeo: $3.00 Mi $9.00 Ph $35.00

PB 94812

Enkvist, Terje

Fytosterin i Talloljebeck. 1947. 3p tables (Text in Swedish) Mi $1.25 Ph $1.25

Abstracts in English and German

Svenska Träforskningsinstitutet. Träkemi och Papersteknik. Meddelande 24

Phytosterol from tall oil is by now used for synthesis of sex hormons. Samples of pitch from the plant of Kalix contained up to 9% sterols precipitable with digitonin. A sample from the continuous distillation at Marma contained 6%, but the corresponding samples from Sandarne only 0,6—1,6 and various samples of crude tall oil from 1.6 to 2,8% sterols precipitable with digitonin. Manufacture of sterols from tall oil pitch seems to be possible. The sterols of the tall oil pitch are mostly esterified. On heating crude tall oil it was found that the greatest part of the sterols were esterified already at 100° C. On continued heating the destruction of the esterified sterols began seriously about 270° C. This result is confirmed by the fact that we found that the content of sterols precipitable with digitonin in pitch from Kalix was 9,7 or 5% according to if the pitch at the distillation in the plant had been heated to 260, 270 or 280° respectively. The differences in content of sterols in pitch from various plants are probably caused by different heating of the pitch at the distillation. Even time of heating and possibly even pressure are important factors besides the temperature itself.

—62133

PB 94793

Erdtman, Holger

Der gehalt des kiefernkernholzes an pinosylvinphenolen II. Ihre quantitative trennung und analytische bestimmung. Apr 1945. 6p graphs, tables (Text in German) Mi $1.25 Ph $1.25

Abstracts in English and Swedish

Svenska Träforskningsinstitutet. Träkemi och Papersteknik. Meddelande 4

Pinosylvin and pinosylvin mono methyl ether appear to exhibit different fungicidal activity towards wood destructing fungi. Hence it was necessary to devise a method for the separate determination of these phenols so that the resistance of pine heart wood could be estimated by chemical analysis. When sufficiently diluted ether solutions of these phenols are shaken with sodium hydroxide solutions of appropriate concentration, pinosylvin migrates much more easily from the ether phase into the alkali phase than the methyl ether. These observations made it possible to develop a method for the quantitative separation of the phenols. Each phenol is then estimated by oxidation with permanganate and isolation of the benzoic acid formed. Samples of heart wood from different pine trees or from different parts of the heart wood were shown to contain pinosylvin amounting to 25-35% of the total amount of pinosylvin and pinosylvin mono methyl ether present.

PB 94814

Enkvist, Terje and Hägglund, Erik

Über schwefellingnine mit hohem gehalt an schwefel. 1948. 19p tables (Text in German) Mi $1.75 Ph $2.50

Abstract in English

Svenska Träforskningsinstitutet. Träkemi och Papersteknik. Meddelande 26

Digesting of spruce wood at 100° C in a water solution of hydrogen sulphide puffered to pH =7 with phosphate, extracting with pyridin and then treating the extract with organic solvents resulted in a series of thiolignin preparates, which after thorough extraction with carbon disilphide contained 7—17,5% sulphur and 12—15,5% methoxyl. The elementary compositions of these thiolignins approaches those found in compounds obtained through the addition of varying quantities of hydrogen sulphide to lignin. The capacity for methylaction with diazomethane did not appear to have increased in the thiolignins as compared to e. g. the »native lignin» according to F. E. Brauns. Cooking spruce wood at 160° C in a solution of sodium hydrosulphide of a strength corresponding to 40% (as NaOH) on the weight of the wood will result in a poorly disintegrated pulp. If cooking with NaSH at 160° C is followed by extraction with sodium hydroxide solution at 100° C and atmospheric pressure, thiolignin goes into solution and may subsequently be precipitated with dilute hydrochloric acid. After thorough extraction with carbon disulphide and ether it contained about 8% of sulphur, almost all

of which was firmly bound. Analyses of thiolignins from hydrosulphide cooks showed that such processing appears to split off a varying amount of water parallel with the addition of hydrogen sulphide of lignin. The small consumption of iodine even subsequent to reduction allows the conclusion that the largest part of the sulphur in the thilignin from sodium hydrosulphide cooks seems to be sulphidic and neither mercaptanic nor disulphidic in nature. The mean molecular weights of a number of alcohol soluble thiolignin preparates were determined according to the methods of RAST and of AF HÄLLSTRÖM. Values varying between about 500 and 1,500 were obtained.

PB 94791

Erdtman, Holger

Untersuchungen über schwefelarme ligninsulfonsäuren. Jan 1945. 7p graph, tables (Text in German) Mi $1.25 Ph $1.25

Abstracts in English and Swedish

Svenska Träforskningsinstitutet. Träkemi och Pappersteknik. Meddelande 2.

An incompletely sulphonated lignin sulphonic acid (corresponding to 23% of the total lignin content) was obtained by sulphonating spruce wood with a strong solution of sodium bisulphite and sodium sulphite of pH about 5, substitution of the sodium ions by hydrogen ions and digestion with hot water followed by precipitation with bis-dimethylaminodiphenyl-methan. The preparation contained 4 S on 7 ≫C_{20}-units≪ and was easily sulphonated by ordinary sulphite cooking acid to a sulphonic acid containing 1 S on each C_{20}-unit. Hence it contains 3 non-sulphonated C_{20}-units of—probably—unmodified, ≫native≪ lignin character. The absorption in U.V. suffers no fundamental change by the sulphonation reaction. It thus follows that the U.V. absorption of the native lignin—if it could be investigated in solution—probably would agree with the absorption of the soluble lignin sulphonic acids and that the sulphonation reaction hardly involves such deapseated changes of the structure of the lignin molecule as the fission of coumarane rings. The absorption agrees with that of BRAUMS' alcohol soluble ≫native lignin≪. When the incompletely sulphonated lignin sulphonic acid is further sulphonated no B-lignin sulphonic acids nonprecipitable by strychnine are formed. It easily suffers autocondensation and in the presence of acids readily condenses with phenols and aromatic amines. On hydrolysis B-lignin sulphonic acids yield sugar i.g. much mannose. The sugar may originate either from lignin-carbohydrate complexes or from sulphonated carbohydrates. Pinoresinol, which cannot be sulphonated, on oxidation with nitrobenzene and alkali affords the same yield of vanillin as wood (≫Native lignin≪).

—62133

PB 95073

Philblad, Nils E.

Fran berzelii glycerinvinsyra till vara dagars alkydhartser, en aterblick, 1847-1947. Transactions of Chalmers University of technology no. 73, Gothenburg, Sweden. 1948. 12p diagr, (Text in Swedish) Mi $1.75 Ph $2.50

Summary in English

PB 95389

Roysen, W. H. and Vanstrum, P. R.

Properties of fluorothene. n.d. 6p graph, tables Mi $1.25 Ph $1.25 (Limited supply mimeo $.10)

(Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)

1. Atomic power—Research 2. Fluorothene 3. AECD 2032

PB 94885

Scaborg, G. T. and others.

Introduction to nuclear chemistry lecture series, May 19 to July 16, 1942. May 1942. 48p graphs, tables Mi $2.50 Ph $6.25 (Limited supply mimeo $.20)

(Also available from U.S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.20)

1. Atomic power—Research 2. Nuclear chemistry 3. MDDC 763

PB 86077a

U. S. Air Force and U. S. Navy Dept.

Dielectric plastic: Polyethylene. Air Force-Navy aeronautical specification. Aug 1948. 2p Mi $1.25 Ph $1.25

PB 95360

Zachariasen, W. H.

Crystal structure of uranium hexachloride. Jan 1948. 5p tables Mi $1.25 Ph $1.25 (Limited supply mimeo $.05)

(Also available from U.S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)

Complete determination of structure by X-ray diffraction: tabulated data. AECD 2184.

DETERIORATION STUDIES

PB 95442

U. S. National Research Council. Prevention of Deterioration Center.

Prevention of deterioration. Advance list 10. Oct 1948. 30p Mi $2.00 Ph $3.75

1. Deterioration, Prevention

PB 95649

U. S. National Research Council. Prevention of Deterioration Center.

Prevention of deterioration. Advance list 11. Nov 1948. 27p Mi $2.00 Ph $3.75

I. Deterioration—Prevention—Bibliography

ELECTRICAL MACHINERY, EQUIPMENT, AND SUPPLIES

Communication Equipment

PB 95597

Bell Telephone Laboratories, Inc., New York

Drawings 8XX-31682: D-151591 radio telephone equipment, schematic diagram, for use in maintenance of receiver-transmitter portion of surplus AN/ARC-1. Nov 1948. 24p Mi $2.00 Ph $3.75

I. Equipment, Communication 2. Telephones, Radio

PB 94788

Hallen, Erik

On antenna impedances. 1947. 15p graphs Mi $1.75 Ph $2.50

The paper contains a complete table of the terms of the numerator and denominator in Hallen's antenna impedance formula (Nova acta Upsaliensis Vol. *11* (1938). No. 4, p. 27). The table associated with that formula computed by Bouwkamp (Physica 9 (1942), p. 609) is found unreliable, whereas that of King and Blake (Proc. IRE *30*, (1942), p. 337) is good but contains only the first order terms. Some admittance diagrams are shown. Acta polytechnica no. 16, 1947.

PB 95434

Hansel, Paul G.

Radio set AN/CRD-2. May 1944. 34p photos, tables Mi $2.25 Ph $5.00

I. Radio—Installation

PB 95394

Helmholz, A. C. and others.

Synchrotron radio frequency system. Jun 1946. 5p Mi $1.25 Ph $1.25 (Limited supply mimeo $.05)

(Also available from U.S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)

The 47.7 mc radio frequency system for the 300 Mev Berkeley synchrotron will be described. The electrons will be accelerated both on entering and on leaving a laminated C shaped electrode, occupying approximately 135 degrees of the electron orbit. The electrode is supported by six coaxial lines, extending radially outward. Five of these lines are terminated at the voltage nodes by ground planes, and the stubs thus formed are tuned over a small frequency range by means of rotating paddles which vary the inductance. The sixth line is electrically a half wave-length. It couples the radio frequency power from the grounded grid type oscillator using a medium mu water cooled triode to the accelerating electrode. Radio frequency excitation for the filament of the tube is obtained from a tap near the node of the half wave-length line. This coaxial line is folded so that the tap point is physically close to the filament and forms with the oscillator a compact structure. The necessary pulsing of the oscillator will be discussed. This work was done under the auspices of the Manhattan District. MDDC 151.

PB 93979

Licklider, J. C. R.

Influence of interaural phase relations upon the making of speech by white noise. Mar 1948. 10p photos, diagrs, graphs, tables Mi $1.25 Ph $1.25

This paper examines the performance of the (binaural) human auditory system in handling the two-wave problem. The effectiveness of the solution is judged in terms of the intelligibility of speech heard against a background of white noise. If monaural intelligibility is taken as a standard of comparison, it is found that the advantage of binaural presentation of the speech and the noise depends upon the interaural phase relations. The auditory system handles best the problems that are easiest for the engineer, though not as effectively as the engineer would handle them. Intelligibility is highest with noise plus speech in one ear, noise minus speech (i.e., the noise wave plus the inverted speech wave) in the other. Words are understood almost, but not exactly, as well with speech plus noise in one ear, speech minus noise (i.e., the speech wave plus the inverted noise wave) in the other. These modes of presentation, in which either the speech waves or the noise waves in the two ears are 180 degrees out of phase, yield word articularion scores as much as 25 percentage units higher than the more conventional mode of presentation in which both the speech waves and the noise waves in the two ears are in phase. Observations with other interaural phase relations and with monaural-binaural presentation of speech and noise are also described. The results suggest a means of providing a small but probably significant improvement in reception whenever speech is heard through earphones in the presence of ambient noise. The scheme is simply to reverse the connections of one of the earphones. The significance of the results for the theory of masking is discussed. PNR 52.

PB 95435

Stephens, Helen

Report on field test No. 3, radio set AN/CRD-2. Jun 1945. 13p graph, tables Mi $1.75 Ph $2.50

I. Radio—Tests

PB 91770s

U. S. Air Force.
Douglas: Installation of radio set AN/ARC-3 -C-47A, B, D, and training versions thereof. Jun 1948. 2p diagr Mi $1.25 Ph $1.25

PB 89229r

U. S. Air Force.
Handbook, maintenance instructions: Radio set AN/ARC-3. Jan 1948. 65p drawings, tables Mi $3.00 Ph $8.75

PB 94992

U. S. Air Force.
Interchangeability charts: Radio, radar, and wire communications equipment. May 1948. 73p tables Mi $3.50 Ph $10.00
I. Communication—Equipment

PB 86916r

U. S. Air Force.
Lockheed: Reduction of radio noise in "D" band of radio receiver AN/ARC-3-P-80A. Feb 1948. 2p table Mi $1.25 Ph $1.25

PB 80453s2

U. S. Air Force.
North American: Installation of radio set AN/ARC-3 and interphone system AN/AIC-2-AT-6D and AT-6F. Mar 1948. 11p photos, drawings, tables Mi $1.75 Ph $2.50

PB 80453s3

U. S. Air Force.
North American: Installation of radio set AN/ARC-3 and interphone system AN/AIC-2—AT-6D and AT-6F. Apr 1948. 1p Mi $1.25 Ph $1.25

PB 85231s

U. S. Air Force.
Republic: Installation of radio set AN/ARC-3—P-47N and TP-47N. Apr 1948. 1p Mi $1.25 Ph $1.25

PB 80509s2

U. S. Army Air Forces.
North American: Replacement of radio sets SCR-274-N and SCR-522-( ) with radio set AN/ARC-3—B-25J. Apr 1948. 1p Mi $1.25 Ph $1.25

PB 87735

U. S. Army Air Forces.
Set: Development, systems, navigation, radio and radar long range, ground communications. Feb 1947. 6p tables Mi $1.25 Ph $1.25
I. Radio, Long range—Navigation 2. Radar, Long range—Navigation

PB 87724

U. S. Army Air Forces.
Set: Training, individual, operator, radio, AAF. Apr 1947. 2p tables Mi $1.25 Ph $1.25
I. Radio—Training devices

PB 95433

U. S. Eatontown Signal Laboratory, Fort Monmouth, N. J.
ESL Instruction Manual for radio set AN/CRD-2 (XO-1). Nov 1945. 64p photos, drawings, tables Mi $3.00 Ph $8.75
I. Radio—Installation

PB 95366

U. S. War Department.
Ringer set TC-24, ringing equipments EE-100-T1, EE-100-A, and EE-101-A. (Voice frequency). Jun 1947. 74p photos, drawings, tables Mi $3.50 Ph $10.00
I. Telephones—Ringers

PB 89562

Vol'Pian, V. G.
Radio interference on an airplane and methods of combatting it. Moscow, Editorial-publishing section of the Air fleet, 1943. U.S.S.R. Peoples' commissariat for the aircraft industry. Transactions of the Scientific research institute for aircraft equipment. 1943. 41p diagrs, graphs Mi $2.50 Enl Pr $7.50
I. Radio interference—Aircraft—Russia

Electronics

PB 91858

Anderson, Lloyd and others.
Reflection of radar waves from targets of simple geometric form. Feb 1943. 17p photo, illus, graphs Mi $1.75 Ph $2.50
I. Radio waves—Propagation 2. Reflection, Electromagnetic 3. NAVSHIPS Prob, X4-49CD

PB 95443

Gt. Brit. Ministry of Civil Aviation.
Descriptive notes on radio systems for use in civil aviation. Jul-Aug 1945. 20p drawings, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.35
I. Radar—Systems—Gr. Britain 2. Radio aids to navigation—Gt. Britain 3. Airplanes, Commercial—Gt. Britain

PB 95441

National Research Council of Canada. Electrical Engineering and Radio Branch.
Progress report for April, May, June, 1948. Jul 1948. 42p photos, diagrs, drawings Mi $2.50 Ph $6.25
I. Atomic power—Research 2. Electronics—Research 3. Radar—Research 4. Radiography—Research 5. Engineering, Electrical—Research

PB 94780

Neovius, Gösta.

New methods of filter design by means of frequency transformations. 1947. 38p diagrs, graphs, tables Mi $2.25 Ph $5.00

The paper contains in a comprehensible form a description of filter design based on methods of frequency transformation as presented by Professor T Laurent in a series of publications in Ericsson Technics. In addition to the original purely graphical method, a tabular transformation procedure is suggested. In order to illustrate the method, examples are given on the calculation and design of low-pass, high-pass, and band-pass filters. In the examples, the attenuation due to losses and reflection is not taken into account. Acta polytechnica no. 8, 1947

PB 85310

U. S. Army Air Forces.

Set: Installation and repair, mobile, field area, ground communication. Feb 1947. 8p tables Mi $1.25 Ph $1.25

I. Radio—Maintenance and repair 2. Radar, Ground controlled approach

PB 87741

U. S. Army Air Forces.

Set: Training, individual, aircraft warning officer and radar repairman, ground reporting equipment (AN/CPS-1). Sep 1947. 3p tables Mi $1.25 Ph $1.25

I. Signals—Ground 2. Radar, Ground control approach 3. Radar, Airborne—Warning equipment 4. Personnel, Radar—Training

PB 87730

U. S. Army Air Forces.

Set: Training, individual, aircraft warning officer and radar repairman, ground reporting equipment (AN/CPS-4). Sep 1947. 3p tables Mi $1.25 Ph $1.25

I. Signals—Ground 2. Radar, Ground controlled approach 3. Radar, Airborne—Warning equipment 4. Personnel, Radar—Training

PB 87740

U. S. Army Air Forces.

Set: Training, individual, aircraft warning officer and radar repairman, ground reporting equipment (AN/CPS-5). Sep 1947. 3p tables Mi $1.25 Ph $1.25

I. Signals—Ground 2. Radar, Ground control approach 3. Radar, Airborne—Warning equipment 4. Personnel, Radar—Training

PB 87739

U. S. Army Air Forces.

Set: Training, individual, aircraft warning officer and radar repairman, ground reporting equipment (AN/TPS-1B and AN/TPS-10A). Sep 1947. 3p tables Mi $1.25 Ph $1.25

I. Signals—Ground 2. Radar, Ground controlled approach 3. Radar, Airborne—Warning equipment 4. Personnel, Radar—Training

PB 87742

U. S. Army Air Forces.

Set: Training, individual, officer, signal equipment maintenance and repair. Sep 1947. 10p tables Mi $1.25 Ph $1.25

I. Signals—Ground 2. Radar, Ground control approach 3. Radar, Airborne—Warning equipment 4. Personnel, Radar—Training

Generators, Motors, Transmission, Distribution, and Allied Equipment

PB 88278

U. S. Air Force.

Beech: Safety-wiring generator switches—all AT-7, AT-11, C-45, CQ-3 and F-2 aircraft. Jan 1948. 2p photos Mi $1.00 Ph $1.00

I. Generators—Controls 2. Switches

PB 80949s

U. S. Air Force.

Curtiss: Relocation of HRU-28 auxiliary power plant—C-46D and C-46F. May 1948. 1p Mi $1.25 Ph $1.25

PB 88858

U. S. Air Force.

Fairchild: Complete generator blast tube modification—C-82A. Feb 1948. 4p drawings, tables Mi $1.25 Ph $1.25

I. Deflectors, Blast

PB 94684

U. S. Air Force and U. S. Bureau of Aeronautics.

Handbook: Overhaul instructions. Transformer rectifier, type FTR 3146-AS (Federal). Jun 1948. 17p photos, drawings, tables Mi $1.75 Ph $2.50

I. Transformers, Rectifier

PB 88277

U. S. Air Force and U. S. Bureau of Aeronautics.

Handbook, overhaul instructions: Voltage booster, types 883-1A, 983-1A and -1L, 1544-1A and -2A. (Eclipse). Jan 1948. 32p photos, drawings, tables Mi $1.75 Ph $4.00

I. Voltage controllers

PB 88060r2

U. S. Air Force and U. S. Navy Dept.

Inverter-instrument, class A, 10 volt-ampere, three phase. Air Force-Navy aeronautical standard. Jul 1948. 1p Mi $1.25 Ph $1.25

PB 94648a

U. S. Air Force and U. S. Navy Dept.

Jack: Tip, voltmeter test. Air Force-Navy aeronautical specification. Oct 1948. 1p Mi $1.25 Ph $1.25

Amendment 1 of PB 94648

PB 86293r

U. S. Air Force and U. S. Navy Dept.
Jack-tip voltmeter test. Air Force-Navy aeronautical standard. Nov 1948. 1p Mi $1.25 Ph $1.25
Revision 2 of PB 86293

PB 91736r

U. S. Air Force and U. S. Navy Dept.
Light assemblies: Work table. Air Force-Navy aeronautical bulletin. Oct 1948. 1p table Mi $1.25 Ph $1.25
Revision 1 of PB 91736

PB 88862

U. S. Air Force.
Lockheed: Installation of inverter change-over relay—P-80B. Feb 1948. 1p Mi $1.25 Ph $1.25
1. Inverters—Installation

PB 94680

U. S. Air Force.
Parts catalog: Transformer rectifier, type FTR 3125-AS. (Federal). Jan 1948. 8p photos, drawings, tables Mi $1.25 Ph $1.25
1. Transformers, Rectifier

PB 88291

U. S. Air Force and U. S. Bureau of Aeronautics.
Parts catalog: Voltage booster, types 883-1-A, 983-1-A and -B, 1544-1-A and -2A. (Eclipse). Jan 1948. 13p photos, drawings, tables Mi $1.25 Ph $2.00
1. Boosters, Voltage

PB 88257r2

U. S. Air Force and U. S. Navy Dept.
Relays: Direct current. Air Force-Navy aeronautical bulletin. Oct 1948. 3p tables Mi $1.25 Ph $1.25
Revision 2 of PB 88257

PB 95587

U. S. War Dept.
Signal generator TS-155C/UP. Nov 1946. 70p photos, drawings, graphs, tables Mi $3.00 Ph $8.75
1. Generators, Signal

Miscellaneous

PB 96087

Fischbach, (Dr.)
Captured German nickel-cadmium alkaline storage batteries. Jun 1948. 10p illus Mi $1.25 Ph $1.25
1. Batteries, Storage—Germany 2. SCEL TR, T-1173

—62133

PB 94737

Forsman, Otto and Olsson, K. G.
Spänningsutlösning I svetsar genom värmning vid relativt låg temperatur. (Stress-relieving in welds by heat-treatment at low temperatures). 1947. 18p photo, graphs, tables (Text in Swedish) Mi $1.75 Ph $2.50
Summary in English
Sweden. Statens Provningsanstalt, Stockholm. Meddelande 98

Large welded containers which have to withstand inner pressure often have such dimensions that it is not possible to diminish the welding stresses by normalizing or tempering the vessels in furnaces. An investigation has been carried out in order to study if the welding stresses will be diminished by heat-treatment at a temperature as low as 200-300° C. Heating to those temperatures may be possible to carry out with air or steam. Plates with thickness 30 mm of ordinary boiler steel with a tensile strength of 44 kg/mm^2 have been butt-welded by the metal-arc process, and the changes of dimensions occuring after 12-15 hrs heat-treatment at 200, 300 and 550° C with slow cooling have been measured. The measuring took place at various points of the weld, using a measuring length of 60 mm. Changes of the dimensions took place transverse the weld as well as along the weld at all three temperatures. They were considerable after heat-treatment at 550° C, and smaller at the lower temperatures. The directions of the changes were the same at all three temperatures. As it is well known that the welding stresses can be regarded as almost fully relieved after heat-treatment at 550° C and slow cooling, the conclusion is drawn that the welding stresses are appreciably diminished and equalized already by heating to 200-300° C. This conclusion is supported from practical experiences with a number of welded sulphite and sulphate digesters, which have been manufactured by welding without subsequent heat-treatment. These vessels have to work at temperatures of 140-190° C and a steam pressure in accordance with the temperature. They have been used during about ten years without showing any cracks, and so it is probable that the working conditions have relieved the most dangerous of the welding stresses. To containers which are too large to be normalized or tempered in furnaces in an ordinary way it is therefore recommended to give a heat-treatment with hot air or steam at as high a temperature as possible prior to their taking into practical use. As to the risk of the steel being aged through such a treatment it is stated firstly that the aging effect will not be greater than what will be the case by prolonged use at ordinary working temperatures, and secondly that aged material that has become brittle at ordinary temperature, will have good toughness at temperatures above 100° C.

PB 94776

Hammarlund, P.

Transient recovery voltage, subsequent to short-circuit interruption with special reference to Swedish power systems. 1947. 286p photos, graphs, table Mi $9.00 Ph $36.25

The paper gives the result of research work initialed in 1938 in Sweden, when a committee for the investigation of switching phenomena in power networks was formed. An extensive and critical review of the existing literature on the subject is given. An analytical treatment is made of the transient oscillation of different network parts and apparatus. Practical methods for calculation are given: values for capacitances and inductances of the network components have been compiled. Measurements confirm that the proposed methods give good practical results. A systematic and thorough investigation of the Swedish networks has been made. Some research work concerning the behavior of circuit-breakers in respect of transient recovery voltage is also published. A survey of the same kind is recommended for other countries, aiming at a universal standard for circuit-breaker testing. Acta polytechnia no. 4. 1947.

PB 94758

Moberg, Harold A: son and others.

Svenska Jordbrukets Eldrift, redogörelse för jordbrukets elinventering. 1947. 113p photos, map, graphs, tables (Text in Swedish) Mi $4.75 Ph $15.00

I. Rural electrification—Sweden 2. Jordbrukstekniska Institutet, Ultuna, Uppsala, Sweden. Meddelande. 208

PB 95017

Steward, C. W.

Multi-arc welding investigation of method for welding aluminum in naval construction. Jul 1947. 13p drawing, graphs Mi $1.75 Ph $2.50

I. Welding, Arc 2. Aluminum—Welding 3. Cornell Aeronautical Laboratory, Buffalo, N. Y.

PB 94682

U. S. Air Force and U. S. Bureau of Aeronautics.

Handbook: Overhaul instructions for hydraulic electric pressure switch, model 1668-D. (Hydro-Aire). Jun 1948. 6p photo, drawings Mi $1.25 Ph $1.25

I. Switches, Electric 2. Switches, Pressure 3. Hydraulic controls

PB 94991

U. S. Air Force.

Interchangeability charts: Electrical accessories for aircraft and miscellaneous electrical equipment. May 1948. 52p tables Mi $2.75 Ph $7.50

I. Aircraft—Electrical systems 2. Airplanes—Electrical systems

—62133

PB 94984

U. S. Air Force.

Set: Instructional, laboratory, electrical engineering. Jun 1948. 2p Mi $1.25 Ph $1.25

I. Laboratories, Aeronautical 2. Engineering, Electrical

PB 85277

U. S. Army Air Forces.

Set: Electroplating, engineering shops. Feb 1947. 2p tables Mi $1.25 Ph $1.25

I. Electroplating—Equipment

PB 85276

U. S. Army Air Forces.

Set: Welding, engineering shops. Feb 1947. 2p tables Mi $1.25 Ph $1.25

I. Welding—Equipment

FUELS AND LUBRICANTS

PB 94180

Alquist, Henry E. and Tower, Leonard K.

Knock-limited performance of blends of AN-F-28 fuel containing 2 percent aromatic amines—IV. Dec 1944. 47p graphs, tables Mi $2.50 Ph $6.25

Tests were conducted to investigate the effect of 2-percent additions of 13 aromatic amines on the knock-limited performance of 28-R fuel in a CFR engine. Knock tests of 28-R fuel and of 13 aromatic amines blended with 28-R fuel in 2-percent concentrations were conducted with a modified F-4 engine at three sets of operating conditions. The amines were synthesized or purchased and purified at the Cleveland laboratory of the NACA and included the following: N-methylcumidines, N-methylxylidines, *p*-ethylaniline, *o*-cumidine, *o*-ethylaniline, N, N-dimethyl-2,4,6-trimethylaniline, N,N-dimethyl-2-methyl-5-isopropylaniline, N-methyltoluidines (80 percent *p*-, 20 percent *o*-), N-methyltoluidines (60 percent *p*-, 40 percent *o*-), N-propylaniline, N-*tert*-butylaniline, 2,5-xylidine, and N-methyl-*p*-*tert*-butylaniline. Ratings were also determined for 28-R and all the test blends with an F-3 engine. The results of knock-limited performance tests with the modified F-4 engine to determine the antiknock effectiveness of 2-percent blends of 13 aromatic amines are summarized as follows: 1. The following aromatic amines were effective antiknock additives when tested at moderate engine conditions over the complete fuel-air ratio range: N-Methylcumidines; N-Methylxylidines; *p*-Ethylaniline; N-Methyltoluidines (80 percent *p*-, 20 percent *o*-); N-Methyltoluidines (60 percent *p*-, 40 percent *o*-); 2,5 -Xylidine; N-Methyl-*p*-*tert*-butylaniline. These amines gave good rich-mixture response at standard F-4 operating conditions but were sensitive to engine severity at lean fuel-air ratios. NACA E-152.

PB 94167

Bernardo, Everett and Eian, Carroll S.

Heat-transfer tests of aqueous ethylene glycol solutions in an electrically heated tube. Aug 1945. 38p drawings, graphs, tables Mi $2.25 Ph $5.00

As part of an investigation of the cooling characteristics of liquid-cooled engines, tests were conducted with an electrically heated single-tube heat exchanger to determine the heat-transfer characteristics of AN-E-2 ethylene glycol and other ethylene glycol-water mixtures for the following ranges of conditions:

Average liquid temperature, °F.....100 to 250
Liquid-flow rate, pounds per second....0.17 to 2.50
Reynolds number.....5,000 to 300,000
Heat flux, Btu per second per square foot...4 to 36

Similar tests were conducted with water and commercial butanol (n-butyl alcohol) for check purposes. The results of tests conducted at an approximately constant liquid-flow rate of 0.67 pound per second (Reynolds number, 14,500 to 112,500) indicate that at an average liquid temperature of 200° F, the heat-transfer coefficients obtained using water, nominal (by volume) 30 percent-70 percent and 70 percent-30 percent glycol-water mixtures are approximately 3.8, 2.8, and 1.4 times higher, respectively, than the heat-transfer coefficients obtained using AN-E-2 ethylene glycol. The heat-transfer coefficients of the coolants tested were satisfactorily correlated using the following equation:

$$\frac{hD}{k} = 0.048 \left(\frac{c\mu}{k}\right)^{0.4} \left(\frac{DG}{\mu}\right)^{0.73}$$

where h is heat-transfer coefficient; D is inside diameter of tube; k is thermal conductivity of liquid; c is specific heat of liquid; μ is absolute viscosity of liquid; and G is mass rate of liquid flow. In the evaluation of this equation, the physical properties used for the aqueous ethylene glycol solutions and water were those compiled by C. S. Cragoe (National Bureau of Standards) for the Coordinating Research Council. NACA E-136

PB 94186

Branstetter, J. Robert and Meyer, Carl L.

Antiknock effectiveness of xylidines in small-scale engines. Aug 1943. 15p graphs, table Mi $1.75 Ph $2.50

Tests were made to determine the effect of mixtures of xylidines and AN-F-28 fuel on the knock-limited performance of small-scale engines. AN-F-28 fuel with no xylidines added and with additions of 1 and 3 percent xylidines was tested in a 17.6 engine under supercharged conditions. Data were obtained on this engine at engine speeds of 1800 and 2700 rpm and at inlet-air temperatures of 150°, 250°, and 325° F. Ratings were obtained for all blends on standard rating engines for the 3-C, the 1-C, and the A.S.T.M. (Motor) Methods. The results are summarized in the following tables:

TABLE I.—EFFECT OF INLET-AIR TEMPERATURE ON KNOCK-LIMITED INDICATED MEAN EFFECTIVE PRESSURE

[17.6 engine; engine speed, 2700 rpm]

Fuel \ Inlet-air temperature, °F	imep, lb/sq in.					
	F/A = 0.065			F/A = 0.10		
	150	250	325	150	250	325
AN-F-28.....	102	81	70	222	176	155
AN-F-28 + 1 percent xylidines.....	91	73	66	211	166	145
AN-F-28 + 3 percent xylidines.....	87	66	63	201	157	136

TABLE II.—EFFECT OF ENGINE SPEED ON KNOCK-LIMITED INDICATED MEAN EFFECTIVE PRESSURE

[17.6 engine; inlet-air temperature, 250° F]

Fuel \ Engine speed, rpm	imep, lb/sq in.			
	F/A = 0.065		F/A = 0.10	
	1800	2700	1800	2700
AN-F-28.....	71	81	156	176
AN-F-28 + 1 percent xylidines.....	67	73	159	166
AN-F-28 + 3 percent xylidines.....	63	66	174	157

TABLE III.—EFFECT OF XYLIDINES IN THE STANDARD RATING ENGINES

Fuel \ Rating method	Modified 3-C Performance number		1-C	A.S.T.M. (Motor)
	Rich	Lean	S-2 + ml TEL	Octane number
AN-F-28.....	130	105	0.08	99.5
AN-F-28 + 1 percent xylidines.....	135	110	.06	99.2
AN-F-28 + 3 percent xylidines.....	145	105	.05	97.1

NACA E-159

PB 94178

Branstetter, J. Robert

Knock-limited performance of blends of AN-F-28 fuel containing 2 percent aromatic amines—I. Apr 1944. 38p graphs, tables Mi $2.25 Ph $5.00

Tests were conducted to investigate the effect of 2-percent additions of 11 aromatic amines on the knock-limited performance of AN-F-28 fuel. A total of 48 aromatic amines are being prepared at the Aircraft Engine Research Laboratory for knock tests. This report presents results for the first 11: aniline, N,N-dimethylaniline, N,N-diethylaniline, N-isopropylaniline, N-butylaniline, N-methyl-*p*-toluidine, N-isopropyl-*p*-toluidine, *p*-isopropylaniline, 2,6-xylidine, 4-isopropyl-2-methylaniline, and *o*-methoxyaniline. The knock-limited performance of an AN-F-28 fuel with and

without 2-percent additions of each of the aromatic amines was determined in a CFR engine under three sets of operating conditions (including F-4 conditions). The report contains only information on the antiknock effectiveness of the aromatic amines and does not consider other phases of the fuel problem, such as their effect on lubrication and synthetic rubbers. The results are summarized as follows: 1. These tests indicate that the following aromatic amines (in addition to xylidines) might be considered of interest as antiknock agents: N-methyl-*p*-toluidine, *p*-isopropylaniline, and aniline. 2. Of the aromatic amines tested, N-methyl-*p*-toluidine gave the best rich-mixture performance. Its antiknock effectiveness at rich fuel-air mixtures was nearly twice that of xylidines. 3. At rich fuel-air mixtures the antiknock effectiveness of the aromatic amines in AN-F-28 fuel was both greater and more independent of engine conditions than at lean fuel-air mixtures. 4. All of the aromatic amines tested with the exception of N-isopropylaniline showed pronounced sensitivity to engine operating conditions at low fuel-air ratios. Because of low or negative response, N-isopropylaniline is not of interest. 5. With the exception of the xylidines and *p*-isopropylaniline, all the aromatic amines tested depreciated the knock-limited performance of AN-F-28 fuel at fuel-air ratios of both 0.062 and 0.070 under F-4 conditions. At the least extreme engine conditions, however, the antiknock effectiveness of the aromatic amines, on a percentage basis, was almost independent of fuel-air ratio. NACA E-148.

PB 94120

Cleaves, Alden P. and Sherrick, Mildred E.

Infrared-spectrophotometric analysis of binary and ternary mixtures of liquid hydrocarbons. Aug 1945. 21p drawings, graphs, tables Mi $2.00 Ph $3.75

An investigation was conducted to determine the suitability and precision of a modified, routine-model, infrared spectrophotometer for analyzing binary and ternary mixtures of aircraft-fuel components. Analyses by means of infrared measurements are described for the following hydrocarbon mixtures: 12 known mixtures of 2,2,3-trimethylbutane (triptane) and cyclohexane, 4 known mixtures of triptane and benzene, and 4 known mixtures of triptane, cyclohexane, and benzene. The effects of certain factors on the accuracy of the analyses are considered and the precision attained is reported. Computed differences between weighed and spectrophotometric percentages are regarded as uncertainties of the analyses. Five repeated spectrophotometric measurements on the groups of four known mixtures make possible the estimation of the reproducibility for these cases. Imperfect reproducibility and minor deviations of the measurements from a linear relation between extinction and concentration are important sources of uncertainty. The results indicate that rapid and reliable analyses of binary and ternary mixtures of the three types of liquid hydrocarbon represented by 2,2,3-trimethylbutane (triptane), cyclohexane, and benzene are feasible by use of a routine-model infrared spectrophotometer with an average uncertainty (relative to compounds regarded as pure) of approximately ± 1 percent. The improved reliability that results from determining the mean of five extinctions indicates the desirability of repeating extinction measurements when a small increase of time required for analysis is unimportant. NACA E-89

PB 94159

Gerrish, Harold C. and Meem, J. Lawrence, Jr.

Measurement of fuel-air ratio by analysis of the oxidized exhaust gas. Oct 1943. 21p photos, graphs Mi $2.00 Ph $3.75

An investigation was made to determine a method of measuring fuel-air ratio that could be used for test purposes in flight and for checking conventional equipment in the laboratory. Two single-cylinder test engines equipped with Wright 1820 cylinders were used. The fuel-air ratio of the mixture delivered to the engines was determined by direct measurement of the quantity of air and of fuel supplied and also by analysis of the oxidized exhaust gas and of the normal exhaust gas. Five fuels were used: gasoline that complied with Army-Navy Fuel Specification No. AN-VV-F-781 and four mixtures of this gasoline with toluene, benzene, and xylene. The method of determining the fuel-air ratio described in this report involves the measurement of the carbon-dioxide content of the oxidized exhaust gas and the use of graphs or the presented equation. This method is considered useful in aircraft, in the field, or in the laboratory for a range of fuel-air ratios from 0.047 to 0.124. NACA E-128

PB 94094

Gerrish, Harold C. and others.

The oxidation of exhaust gases at room temperature. Feb 1945. 26p photos, drawing, graph, tables Mi $2.00 Ph $3.75

An investigation was made to determine the effectiveness of various oxides and oxide mixtures in oxidizing at room temperature the exhaust gases from an internal-combustion engine for the determination of fuel-air ratio. The oxides of silver, copper, manganese, cobalt, nickel, iron, cerium, lead, bismuth, and mercury were tested individually and in various combinations. At a fuel-air ratio of 0.090 and a gas flow of 100 cubic centimeters per minute, it was found that various oxide mixtures would completely oxidize the exhaust gases at room temperature but the useful life of the three best oxide mixtures was only about 60 minutes for the 20-gram sample, which precluded their use for the service intended. The best oxide mixtures were those of silver with Hopcalite, silver with cobalt and nickel, and silver with manganese. Although

some oxides had an inhibiting effect on each other, silver oxide has a promoting effect on the life of almost any oxide mixture tested. NACA E-62.

PB 94130

Gilbert, Mitchell

Effect of aromatics and spark advance on thermal efficiency. Sep 1942. 17p graphs Mi $1.75 Ph $2.50

An analysis of experimental and theoretical data indicates that critical evaluation of fuel performance, especially economy, must be made in the engine. Specific factors, such as the aromaticity of a fuel and the degree of spark advance of the engine may cause the thermal efficiency to vary at given fuel-air ratios. Thermodynamic analysis and consideration of combustion time indicate that this variation may be contrary to that expected from a knowledge of the change in heating value with change in fuel composition. Data show that heating value is, from the aspect of fuel economy, not so important an aviation-fuel specification as believed. The knock ratings of fuels are affected by spark advance. As spark advance must account for variations in burning time of fuels, it is to be expected that, over the range of fuel-air ratios, a constant spark advance must penalize some fuels more than others and the same fuel diversely, depending upon the magnitude of the spark advance. In instances in which the operating fuel-air ratio may be easily varied, advantages in fuel economy are obtainable without sacrificing knock rating by leaning simultaneously with retarding the spark. NACA E-99

PB 95515

Gt. Brit. Ministry of Supply.

Aircraft material specification, high altitude controls lubricant. Jun 1948. 6p drawings Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.35

1. Lubricants—Tests—Gt. Brit. 2. Engines, Aircraft—Lubricating oils—Gt. Brit.

PB 94192

Jones, Anthony W. and others.

Knock-limited performance of six aromatic amines blended with a base fuel-scale aircraft-engine cylinder. Apr 1945. 16p graphs, table Mi $1.75 Ph $2.50

Tests were made to investigate the effect of 2-percent additions of six aromatic amines on the knock-limited performance of 28-R fuel in a full-scale aircraft-engine cylinder. Tests were conducted with a Wright R-1820 G200 cylinder at two operating conditions with a 2-percent blend in 28-R fuel of the following six aromatic amines: N-methylxylidines (mixed isomers), N-methylcumidines (mixed isomers), N-methyltoluidines (75 percent p-, 25 percent o-), xylidines (mixed isomers), cumidines (mixed isomers from refinery cumene), and N-methylaniline (pure). Correlations of the full-scale engine data with published small-scale engine data are also presented. The results are summarized in the following table:

RATINGS OBTAINED IN A WRIGHT R-1820 G200 CYLINDER

For each compound there are two rows of values. The first row is imep, lb/sq in.; the second is imep ratio, which is the ratio of the imep of 98 percent 28-R fuel plus 2 percent aromatic amine to the imep of 28-R.

Compound	Concentration in 28-R fuel[a] (per cent by wt.)	Engine speed, 2000 rpm; inlet-air temperature, 210° F			
		Spark advance, 20° B.T.C.; atmospheric exhaust pressure		Spark advance, 30° B.T.C.; exhaust pressure, 15 in. Hg absolute	
		Fuel-air ratio		Fuel-air ratio	
		0.07	0.10	0.07	0.10
N-methylxylidines (mixed isomers)	2	193 1.25	283 1.12	184 1.03	249 1.06
N-methylcumidines (mixed isomers)	2	208 1.34	290 1.15	194 1.08	259 1.10
N-methyltoluidines (75 percent p-, 25 percent o-)	2	216 1.39	288 1.14	187 1.05	260 1.10
Xylidines (mixed isomers)	2	192 1.24	280 1.11	184 1.03	257 1.09
Cumidines (mixed isomers from refinery cumene)	2	200 1.29	282 1.11	188 1.05	250 1.06
N-methylaniline (pure)	2	210 1.36	290 1.15	190 1.06	262 1.11
Base fuel (28-R)	100	155 1.00	253 1.00	179 1.00	236 1.00

[a]Final tetraethyl-lead content in blends, 4.44 ml/gal.

NACA E-165.

PB 94535

McBain, J. W. and others.

Foaming of aircraft-engine oils as a problem in colloid chemistry—1. Sep 1944. 128p drawings, tables Mi $5.00 Ph $16.25

An investigation has been conducted on the foaming characteristics of representative aircraft-engine lubricants in order to arrive at an adequate theory of the foaming of such oils. In the course of the research the effect of adding a large number of chemical agents was studied, and the results of these tests are presented. Methods of measuring foaming have been compared and analyzed for their significant factors. While it was not possible to establish a relationship between chemical

composition and the foaming tendency of aircraft-engine lubricants in the preliminary investigation, which is described in this report, considerable progress has been made toward the goal. In addition, many antifoaming agents have been tested which, in laboratory tests, are adequate to prevent or minimize foaming of aeronautical oils. Certain of these agents are found to be ineffective at elevated temperatures. Various theories on the foaming of chemical mixtures are discussed and developed, together with explanations of the action of antifoaming agents. NACA W-52.

PB 94183

Meyrowitz, Emanuel and Olson, Walter T.

Effect of xylidines on the corrosiveness of aircraft-engine oil. Jul 1943. 9p photos, graph Mi $1.25 Ph $1.25

Tests were performed to determine the effect of xylidines of the corrosiveness of aircraft-engine oil toward engine bearings as part of an investigation on the suitability of xylidines as an antiknock component in aviation gasoline. The Shell thrust-bearing corrosion test was performed with 65 copper-35 lead bearings using new oil both without and with xylidines and used oil from piston-ring sticking engine runs both without and with xylidines added to the fuel and the oil. The results of the Shell thrust-bearing corrosion test are summarized as follows:

Sample	Bearing loss at 20 hours (mg/cm²)	
	225°F	320°F
Navy 1120	0.87	16.1
Navy 1120 + 0.5-percent xylidines	1.7	1.0
Navy 1120 + 1-percent xylidines	1.6	3.8
Navy 1120 + 3-percent xylidines	.58	2.2
Navy 1120, used without xylidines	1.4	6.6
Navy 1120, used with xylidines in fuel and oil	.61	4.5

An examination of bearing sections perpendicular to the bearing surface revealed that the corrosion with straight mineral oil was largely a loss of lead and for the corrosion with the oils that contain xylidines the copper in the bearing was attacked as well. The effect of xylidines on the corrosiveness of aircraft-engine lubricating oil was negligible or, if anything, was to render the oil less corrosive toward copper-lead bearings under the conditions of the Shell thrust-bearing corrosion test. NACA E-156

PB 92421

Mortensen, K. N. and Paterson, A. A. C.

Performance of some soluble cutting fluids in machining operations and its correlation with laboratory friction measurements. Dec 1944. 17p photos, drawings, graphs, tables Mi $1.75 Ph $2.50

Laboratory friction tests showed a soluble cutting paste containing sulphurised fat and a chlorine compound to posses greater lubricating power under the conditions of test than four conventional type soluble oils. Results of machining tests under factory conditions, with the exception of certain broaching results, showed no appreciable difference in performance of the fluids.

PB 94187

Olson, Walter T. and Spurr, Robert A.

Effect of xylidines on the load-carrying capacity of an aircraft-engine oil—II. Sep 1943. 10p graphs, tables Mi $1.25 Ph $1.25

Tests were made to continue a study of the effect of xylidines on the load-carrying capacity of an aircraft-engine oil in several test devices. As part of an investigation on the suitability of xylidines as an antiknock component in aviation gasoline, Navy 1120 lubricating oil, both new and used, and Navy 1120 lubricating oil, both new and used, to which had been added 1 percent by weight of commercial mixed xylidines were tested in a Shell four-ball machine, an Almen machine, an SAE extreme-pressure lubricant-testing machine, and in an NACA bearing-testing attachment. Data from a previous investigation on the effect of a 2-percent addition of xylidines to Navy 1120 lubricating oil in these machines are presented for comparison. The results obtained are summarized in the following table:

PERCENTAGE CHANGE WITH ADDITION OF XYLIDINES TO NAVY 1120 OIL

	Navy 1120 oil plus 2 percent xylidines (percent)[a]	Navy 1120 oil plus 1 percent xylidines (percent)	Used Navy 1120 oil plus 1 percent xylidines (percent)
Four-ball Machine:			
Time for 360 rpm deceleration	-3.3	[b]0.55	[b]-1.0
Coefficient of sliding friction at contact surfaces	3.4	[b]-.54	[b].99
Almen machine:			
Failure load	-15	-17	-14
Coefficient of friction, all loads	35	11	5.0
Wear-scar width	35	0	27
SAE machine:			
Scoring load	-23	-8.7	(c)
NACA attachment:			
Failure load—			
Series 1	-5.1	[b]0.81	[b]-0.73
Series 2	-2.2	[b]-2.8	[b]-3.2

[a]Data from a previous NACA investigation.

[D]Values are thought to be smaller than experimental error.

[C]Sufficient Timken cups were not available to permit testing of used oil.

The tests with the four-ball machine and the NACA bearing-testing attachment showed no significant change in load capacity on the addition of 1 percent xylidines. The reduction of load capacity on the Almen machine on addition of either 1 or 2 percent xylidines was about 15 percent for both new and used oils; that for the SAE machine with new oil and 1 percent xylidines was about 9 percent. Addition of 1 percent by weight of xylidines decreased the load-carrying ability of new and used Navy 1120 lubricating oil in the Almen and in the SAE machines. It was without significant effect on the performance of new and used Navy 1120 oil in the Shell four-ball machine and in the NACA bearing-testing attachment. NACA E-160.

PB 94185

Olson, Walter T. and Meyrowitz, Emanuel

Effect of xylidines on the stability of aircraft-engine lubricating oil. Aug 1943. 11p drawing, graphs, table Mi $1.75 Ph $2.50

Tests were made to determine the effect of xylidines on the stability of an aircraft-engine lubricating oil. The Indiana oxidation test and measurements of the oxygen absorption rate of the oil samples were performed on Navy 1120 oil, Navy 1120 oil plus 0.5 percent by weight of xylidines, and Navy 1120 oil used in piston-ring-sticking tests both without and with xylidines. Laboratory inspections performed on used oils from the beginning and end of several piston-ring-sticking tests without and with xylidines added to the fuel and the oil are compared. The rate of increase of kinematic viscosity with time in the Indiana oxidation test at 175° C was decreased by the addition of xylidines to new oil. The same is true for used oil with xylidines as compared with used oil without xylidines. The initial rates of oxidation at 175° C, as measured in a closed flask, were less for both new and used oils containing xylidines than for oils containing no xylidines. The addition of 0.5 percent by weight of xylidines to Navy 1120 oil decreased the rate of oxidation of this oil at 175° C as measured in an automatic oil-oxidation apparatus. Comparison of laboratory inspections of oils used without and with xylidines indicated that the xylidines may have had a slight stability-promoting effect. All the oils displayed good stability characteristics in bulk under the conditions of the engine tests. The stability of Navy 1120 oil toward oxidative deterioration, as determined by several laboratory tests, was increased by the addition of small amounts of xylidines. NACA E-158

—62133

PB 94190

Olson, Walter T. and others.

Gasoline-water distribution coefficients of 27 aromatic amines. Aug 1944. 15p graphs, tables Mi $1.75 Ph $2.50

Tests were made to determine experimentally the gasoline-water distribution coefficients for 27 aromatic amines tested as antiknock additives: to correlate molecular structure with distribution coefficient; and to evaluate the relative suitability of fuels blended with these amines with respect to overwater storage. Gasoline-water distribution coefficients were determined for 27 aromatic amines. The gasoline used contained 15 percent aromatic hydrocarbons by volume. The distribution coefficients were measured at two temperatures, 40° F and 100° F, for three concentrations of amine in the gasoline, 1, 3, and 6 percent by weight. The results are summarized in the following table. Coefficients measured for 3 percent amine in gasoline at 40° F are given as representative of the data. The amines are listed in order of increasing distribution coefficient. NACA E-163

PB 94188

Olson, Walter T. and Tischler, Adelbert O.

Loss of xylidines in overwater storage of xylidine-blended fuel. Mar 1944. 10p graph, tables Mi $1.25 Ph $1.25

The purpose of the tests made were twofold: (a) To determine the relationships for estimating the maximum amount of a water-soluble gasoline additive that will diffuse from the gasoline to the water when the fuel is stored over water and (b) to determine from these relationships the amount of xylidines that will diffuse from the gasoline to the water in an overwater-storage system. A physical expression for the loss of water-soluble additive was derived for each of the following conditions of storage-tank operation: (1) Equilibrium distribution of additive between the two layers is nearly attained during the period between successive additions or withdrawals of the fuel but, during the actual addition or withdrawal of fuel, no significant transfer of additive occurs between the gasoline and water layers. (2) Equilibrium distribution of additive between the gasoline and the water layers exists at all times. The estimated values of xylidines concentration in fuel stored over water were checked against such experimental data that exist. The derived formulas for estimating the loss of water-soluble additive in overwater gasoline storage check reasonably well with the experimental data available. The estimated loss of xylidines from gasoline stored over water for the conditions of storage-system operation indicated are as follows:

PERCENTAGE DECREASE OF ORIGINAL CONCENTRATION OF XYLIDINES IN GASOLINE

[Distribution coefficient, K=20]

Volume percentage of original fuel remaining in tank	Condition		
	Continuous equilibrium	Each batch removed, 10 percent of tank volume	Single batch removed
80.....	1	1	1
50.....	3	4	4
20.....	7	8	17
10.....	10	12	31
1.....	14	19	85

The data indicate that the losses of xylidines from gasoline stored over water would not be excessive provided that not more than 80 percent of the fuel was replaced by xylidine-free water. NACA E-161.

PB 94181

Olson, Walter T.

Low-temperature solubility of technical xylidines in aviation gasoline. Jun 1943. 6p drawings, tables Mi $1.25 Ph $1.25

Tests were made to determine the low-temperature solubility of technical xylidines in aviation gasoline. The tests included measuring the cloud point, or incipient separation temperature, at several concentrations of technical xylidines in a 65-octane-number clear gasoline without aromatics and with aromatics added in various percentages up to 15 percent by volume and a grade 130, specification AN-F-28, amendment 2, gasoline. Cloud points were determined as a function of concentration of xylidines in the gasolines described with an experimental reproducibility of ±1.5° C. The concentrations of xylidines that gave a cloud point of -60°C as found by interpolation of the experimental data were:

Concentration of xylidines (percent by weight)	Fuel
3.7.....	Extracted grade 65.
5.0.....	Grade 65 as delivered.
7.3.....	Extracted grade 65 containing 5 percent by volume of mixed aromatics.
Over 10.....	Grade 65 containing 10 and 15 percent by volume of mixed aromatics; grade 130.

From the results it was concluded that: 1. Technical xylidines in quantities up to 3.5 percent by weight may be added to hydrocarbon fuels similar to those used in this investigation with no likelihood that separation will occur at -60° C. 2. The presence of aromatic hydrocarbons in the fuel increases the solubility of xylidines. NACA E-153

—62133

PB 94189

Olson, Walter T. and Kelley, Richard L.

Low-temperature solubility of aniline, the toluidines, and some of their N-alkyl derivatives in aviation gasoline. Jun 1944. 13p drawings, tables Mi $1.75 Ph $2.50

Tests were made to determine the solubilities in gasoline at low temperatures of 15 of the aromatic amines from the NACA exploratory program on aromatic amines as antiknock additives. Solubilities of aniline, the toluidines, and several of their respective N-alkyl derivatives were measured in three different gasolines at temperatures as low as -65°C and at concentrations as high as 16 percent by weight. Solubility at -60° C was a particular objective of the test work. The solubility data for the amines are summarized in the following table by interpolating or extrapolating the experimental results to obtain the solubility at -60° C. The data for the xylidines are included for comparison.

SOLUBILITY OF AROMATIC AMINES IN THREE AVIATION FUELS AT -60° C

[Percentages by weight]

Amine	Grade 65, aromatics extracted	Extracted grade 65 plus 15 percent (by volume) aromatics[a]	Grade 130[b]
Aniline.....	< 0.5	0.5	....
N-Methylaniline.....	3.6	12.0 (-62° C)	14.3
N-Ethylaniline.....	>10	>10	>10
N-Propylaniline.....	>10	>10	>10
N-Isopropylaniline.....	>10	>10	>10
N-Butylaniline.....	2.0	5.6	3.8
N-*tert*-Butylaniline....	>10	>10	>10
N,N-Dimethylaniline....	4.7	9.7	8.3
N,N-Diethylaniline.....	>10	>10	>10
o-Toluidine.....	1.3	4.2	4.4
m-Toluidine.....	<0.5	2.8	3.6
p-Toluidine.....	<0.5	<0.5	<0.5
N-Methyl-*p*-toluidine...	>10	>10	>10
N-Ethyl-*p*-toluidine....	>10	>10	>10
N-Isopropyl-*p*-toluidine	>10	>10	>10
Xylidines (commercial)[c]	3.7	>10	>10

[a]Mixed aromatics consisted of five parts xylene, two parts cumene, and one part toluene.

[b]Specification AN-F-28, Amendment-2.

[c]Previously reported.

NACA E-[redacted]162

PB 94055

Pinkel, Benjamin and Turner, L. Richard

Thermodynamic data for the computation of the performance of exhaust-gas turbines. Oct 1945. 99p fold graphs, tables Mi $4.25 Ph $12.50

Information published in chemical journals from 1933 to 1939 on the thermodynamic properties of the

component gases of exhaust gases based on spectroscopic measurements were used as data for computing the ideal values of work, mass flow, nozzle velocity, power, and temperature change involved in the thermodynamic processes of a gas turbine. Curves from which this information can conveniently be obtained are given. An additional curve is included from which the heat flow may be calculated for nonadiabatic processes. A method of computation is presented in which the thermodynamic quantities associated with an isentropic process are calculated by the use of two effective values of the ratio of specific heats γ simply related to the value of μ at the start of the process and to the pressure ratio. These values of γ are used in the equations derived on the assumption of constant specific heat and thus permit convenient algebraic manipulation of the thermodynamic quantities. The relation of these values of γ to the conventional thermodynamic functions and the condition for the validity of the method is derived. This method applies accurately for thermodynamic processes occurring within the temperature range of about 700° to 2700° F absolute. NACA E-23

PB 95563

Rubin, Bernard.

Analysis of oil-like substance from type A-9A oxygen regulator. Oct 1948. 1p Mi $1.25 Ph $1.25

I. Oils—Analysis

PB 94149

Sanders, Newell D.

Method of estimating the knock rating of hydrocarbon fuel blends. Aug 1943. 29p graphs, table Mi $2.00 Ph $3.75

I. Fuels, Aviation—Knocking

Blending equations have been determined from an analysis based on certain assumptions relative to the cause of fuel knock. These equations are then applied to knock data of fuel blends determined both by the supercharged method and by the critical-compression-ratio method. The experimental data were taken chiefly from reports prepared by the Ethyl Corporation and by Smittenberg, Hoog, Moerbeek, and v.d. Zijden. 1. An equation is derived that may be used for calculating the knock limit of fuel blends when tested in a supercharged test engine. This equation indicates that, when fuel blends are tested by a supercharged-engine test method, the reciprocal of the knock-limited, inlet-air density of a fuel equals the weighted average of the reciprocals of the knock-limited, inlet-air densities of the pure components. The same law applies when indicated mean effective pressure is used in place of inlet-air density. The limited amount of experimental data available is in agreement with this theory. 2. An equation is derived that may be used for calculating the knock limit of fuel blends when tested by critical-compression-ratio methods. The equation indicates that the blending characteristics of fuels may be estimated if the ratings of the pure components and the values of the blending constants are known. The blending constant of a compound has a fixed value that is independent of the compounds with which it is blended. This conclusion has been verified by experimental data in four cases. 3. The curve showing the relation between critical compression ratio and percentage of one component in a binary fuel blend is an equilateral hyperbola. 4. A graphical method of determining the critical compression ratios of fuel blends has been developed. An example chart using A.S.T.M. (Motor) Method test data has been constructed. 5. The blending equations may be applicable to leaded-fuel blends. Although the method developed herein does not apply to all fuels and the experimental data available are not extensive enough to thoroughly check the theory it is believed that the analysis as presented will be of assistance in understanding the relationships that exist between the knock testing of pure and of blended fuels. NACA E-118.

PB 94184

Spurr, Robert A. and Olson, Walter T.

Effect of xylidines on the load-carrying capacity of an aircraft-engine oil—I. Aug 1943. 12p drawings, graph, tables Mi $1.75 Ph $2.50

Tests were made to determine the effect of xylidines on the load-carrying capacity of aircraft-engine oil in several test devices. As part of an investigation on the suitability of xylidines as an antiknock component in aviation gasoline, Navy 1120 lubricating oil and Navy 1120 lubricating oil to which had been added 2 percent by weight of commercial mixed xylidines were tested in a Shell four-ball machine, an Almen machine, an SAE extreme-pressure lubricant-testing machine, and in an NACA bearing-testing attachment. Results of the tests are summarized as follows:

	Navy 1120 oil	Navy 1120 oil plus 2-percent xylidines	Percentage change with xylidines
Four-ball machine:			
Time for 360 rpm deceleration, min	2.220 ± 0.011	2.147 ± 0.019	−3.3
Coefficient of sliding friction at contact surfaces	0.1109 ± 0.0006	0.1147 ± 0.0010	+3.4
Almen machine:			
Failure load, lb/sq in.	4100 ± 580	3500 ± 370	−15
Coefficient of friction (all loads)	0.17 ± 0.01	0.23 ± 0.01	+35

	Navy 1120 oil	Navy 1120 oil plus 2-percent xylidines	Percentage change with xylidines
Almen machine—Con. Wear-scar width, in.....	0.049 ± 0.010	0.066 ± 0.021	+35
SAE machine: Scoring load, lb.	138 ± 12	106 ± 4	-23
NACA attachment: Failure load, lb/sq in—			
Series 1.....	3160 ± 7	3000 ± 17	-5.1
Series 2.....	2985 ± 24	2920 ± 9	-2.2

Addition of 2 percent by weight of xylidines decreased the load-carrying ability of Navy 1120 lubricating oil on the machines tested. Because these machines do not reproduce aircraft-engine operating conditions, these results should be considered as indicating a difficulty to be watched for rather than a difficulty to be expected. It is also pointed out that the percentage of xylidines in the oil tested was higher than might be experienced in service. NACA E-157.

PB 94154

Tischler, Adelbert O.

Determination of iron contamination of used lubricating oil for use in measuring rates of wear in aircraft engines. Mar 1944. 14p graphs, tables Mi $1.75 Ph $2.50

Two methods of separating the iron from the used lubricating oil are presented. In one procedure the oil is burned and the residual ash containing the iron is dissolved in acid; in the other, the iron is extracted from the oil with acid. Methods are described for determining the amount of iron present in the resulting solutions using o-phenanthroline to form a colored complex with the iron. The results obtained in the analyses of lubricating oil for iron contamination using the procedures described are as follows: 1. The iron concentrations of oil samples containing from 0.0001 to 0.010 percent by weight of iron can be determined. 2. With the ashing procedure, the average difference between the results of duplicate analyses of 40 representative samples of used lubricating oil was less than 5 percent. 3. The use of porcelain crucibles for ashing resulted in a loss of iron. This loss was avoided when silica crucibles were used. 4. Extraction of lubricating-oil samples with dilute hydrochloric acid for 4 hours yielded a recovery of 98 percent of the iron in the oil. 5. With calibration, any photoelectric or visual-type colorimeter will be found suitable for measurement of the color intensities of the iron o-phenanthroline solutions. Comparison of results obtained for the same solutions with a spectrophotometer and a colorimeter showed an average difference of less than 3 percent. NACA E-123.

PB 94182

Tischler, Adelbert O. and others.

Gasoline-water distribution coefficients of xylidines. Jun 1943. 10p graphs, table Mi $1.25 Ph $1.25

Experimental data were obtained on the distribution coefficients of technical xylidines for the system gasoline-water. The distribution coefficient is defined as the ratio of the concentration of xylidines in the gasoline layer to that in the water layer. The data may be used to estimate the maximum loss of xylidines from the fuel layer in water-displacement storage systems. The gasoline-water distribution coefficients for xylidines in three different fuels (grade 65 aromatic free, grade 65 as received plus 15 percent of an aromatic mixture, and grade 130) were determined. The effects of concentration of xylidines in the fuel, aromaticity of the fuel, sea water instead of fresh water, and temperature were investigated. The variation in the loss of xylidines from gasoline stored over water is discussed in terms of the distribution coefficients. The results are summarized in the following table:

Temperature (°F)	Xylidines (percent)	Fresh-water extraction			
		Grade 65, aromatic-free		Grade 130	
		Kwt	Kvol	Kwt	Kvol
40.....	1.0	12	8.5	19	13
	3.0	15	10.5	22	15
100.....	1.0	24	17.0	36	25
	3.0	26	18.0	37	26

The distribution coefficient K increased with the addition of about 18 percent aromatics to the aromatic-free fuel to values comparable with these for grade 130 fuel. The use of sea water instead of fresh water also increased the distribution coefficient. NACA E-154.

PB 94677

U. S. Air Force.

Antifriction bearings: Relubrication of bearings (double closure type). Jul 1948. 3p tables Mi $1.25 Ph $1.25

1. Bearings—Lubrication

INSTRUMENTS

PB 95410

Auld, B. A.

An infra-red detector for the location of faulty joints in power transmission lines. Jul 1948. 8p photo, diagr Mi $1.25 Ph $1.25

A summary of the developmental work completed up to the present time on an infra-red detector, designed to locate hot joints in overhead power line conductors, is given. The method of detection is based on the observation of temperature difference between the joint and the conductor, this temperature difference being observed by means of thermal radiation focussed on a bolometer by a parabolic reflector. A study was made of three types of bolometers for this application, (a cellophane-type, a thermistor-type, and a platinum-type), using (1) a circuit-breaker type of chopper to interrupt the output of a d-c bolometer bridge, (2) a radiation chopper employed with a d-c bolometer bridge, (3) and an a-c bolometer bridge. It was found that the most satisfactory results were achieved with a thermistor-type bolometer in an a-c bridge circuit. The signals from this bridge, amplified by a conventional a-c amplifier with a phase sensitive rectifier output, operated a fifty micro-ampere, zero-center meter, used as an indicator. The instrument will be completely self-contained, including the electrical circuits, batteries and optical system. It will be tripod-mounted and comparable in ruggedness and portability to a surveyor's transit. Sub-miniature tubes will be used throughout, and, in order to facilitate servicing in the field, all circuits will be constructed as plug-in units. NRCC ERA-155.

PB 95370

Bell, P. R.

Pocket radiation alarm. Aug 1947. 8p photos, drawings Mi $1.25 Ph $1.25 (Limited supply mimeo $.10)
(Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)
1. Atomic power—Research 2. Radiation alarms

PB 95409

Bourne, B. E. and McKinley, D. W. R.

A pulsed crystal oscillator range calibrator. Oct 1948. 9p drawings, diagrs, photos Mi $1.25 Ph $1.25
A pulsed crystal oscillator calibrator unit is described, which will accept either positive or negative synchronizing pulses and will produce a finite series of pips of either 2-km or 20-km spacing. After a desired interval, say 300 km, the crystal is stopped and the system is returned to its initial condition, and is ready to accept another trigger pulse. This unit has given satisfaction when used with spark-gap modulated pulse transmitters, the range error of the calibration pips being less than 0.1 per cent. NRCC ERA-162.

PB 92825

Brown, F. W. and Willoughby, A. B.

Optical method of determining thickness of Geiger tube windows. Problem assignment 8P12. Final report. Mar 1948. 5p photo, graph Mi $1.25 Ph $1.25
1. Mica—Thickness 2. N. Rad L ADP-26

PB 94886

Crits, G. J. and Newlin, G. C.

Recording type automatic Geiger tube calibrator. Apr 1948. 7p diagrs, drawings Mi $1.25 Ph $1.25 (Limited supply mimeo $.10)
(Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)
Before a Geiger tube can be used, it is necessary to calibrate it or plot a curve showing its plateau of operation. This report describes a means of plotting the plateau of a Geiger tube automatically. AECD 2025.

PB 94875

Gamertsfelder, C. C.

Calculations for use with the fast neutron meter. Jul 1948. 4p diagr, tables Mi $1.25 Ph $1.25 (Limited supply mimeo $.05)
(Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)
Equations were derived and neutron tolerance doses calculated for use with a fast neutron meter consisting, briefly, of two chambers filled with argon and methane, respectively, and mounted on boxes containing Lindermann electrometer systems: (method of calibration described): data. AECD 2173.

PB 92705

Gt. Brit. Medical Research Council.

Hearing aids and audiometers. Aug 1947. 74p diagrs, drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, New York $.45
1. Hearing aids—Gt. Brit. 2. Audiometers—Gt. Brit. 3. MRC SR 261

PB 89408

Koliasev, F. E.

Universal hygrometer. Reports of the V. I. Lenin all-union Academy of Agricultural Sciences, 1941, issue 8, p 47-48. 1941. 4f Mi $1.25 Enl Pr $2.50
1. Hygrometers—Russia

PB 95375

Laskin, Sidney.

Modified cascade impactor. Jun 1946. 7p drawings Mi $1.25 Ph $1.25 (Limited supply mimeo $.10)
(Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)
1. Atomic power—Research 2. Impactors, Cascade 3. MDDC 1500

PB 94869

Neil, Hugh G.

RC ohmmeter. Jan 1946. 4p photo, diagr, drawing Mi $1.25 Ph $1.25 (Limited supply mimeo $.05)
(Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)

The RC ohmmeter is an instrument suitable for measuring resistors in the range of 10^{10} to 10^{12} ohms. A 300 $\mu\mu$f condenser is discharged through the resistor in question and the time required for the voltage across the condenser to decrease to 1/e of its original value is measured. The resistance is calculated from $R = C/t$, where R is in ohms, C in farads, and t in seconds. The accuracy of this instrument (which uses a vacuum tube electrometer) is limited primarily by the accuracy of the timing method used. AECD 1978.

PB 94881

Pardue, L. A. and others.

Photographic film as a pocket radiation dosimeter. Apr 1944. 7p photos, graphs Mi $1.25 Ph $1.25 (Limited supply mimeo $.10)
(Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)
I. Atomic power—Research 2. Dosimeters 3. MDDC 1065

PB 95385

Smith, Robert J.

Barnaby: Transportable counting-rate meter for gamma measurements up to 200 feet distant by means of a small probe. Aug 1945. 5p drawings, table Mi $1.25 Ph $1.25 (Limited supply mimeo $.05)
(Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)
I. Atomic power—Research 2. Instruments, Measuring 3. Gamma rays—Measurements 4. AECD 1997

PB 95565

Spragg, S. D. S.

Dial reading performance as related to illumination variables: I. Intensity. Oct 1948. 32p tables Mi $2.25 Ph $5.00
I. Illumination, Instrument

PB 92457r

U. S. Air Force and U. S. Navy Dept.

Computor: Dead reckoning. Air Force-Navy aeronautical standard. Sep 1948. 1p drawings Mi $1.25 Ph $1.25

PB 87506r

U. S. Air Force and U. S. Bureau of Aeronautics.

Handbook, overhaul instructions: Pedestal sighting stations, models 2CSR485, 2CSR486. (General Electric). Feb 1948. 17p photos, drawings, tables Mi $1.75 Ph $2.50

PB 92460a

U. S. Air Force and U. S. Navy Dept.

Thermocouple: Chromel-alumel, range 0 to + 1000 degrees centigrade. Air Force-Navy aeronautical specification. Oct 1948. 1p Mi $1.25 Ph $1.25

Amendment 1 to PB 92460

—82133

PB 87737

U. S. Army Air Forces.

Kit: Master machinist, precision instrument, armament laboratory. Feb 1947. 7p tables Mi $1.25 Ph $1.25
I. Bombing, Precision—Instruments

PB 87743

U. S. Army Air Forces and U. S. Bureau of Aeronautics.

Overhaul instructions for D-C selsyn liquid level indicators and transmitters. (General Electric). Aug 1947. 246p photos, drawings, tables Mi $9.00 Ph $31.25
I. Indicators, Liquid level 2. Transmitters, Liquid level

PB 95361

Wouters, Louis

Solid counters: Scintillation counters. Jun 1948. 10p diagrs, drawings Mi $1.25 Ph $1.25 (Limited supply mimeo $.10)
(Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)
The detector and amplifier, detection material, crystallization of anthracene, optical systems, the photomultiplier, pulse and noise characteristics of the overall detector, high gain photomultiplier operation, pre-amplifier, procurement, the counting equipment and applications are discussed; figures. AECD 2203.

PB 95388

Wu, C. S. and Rainwater, L. J.

Portable alpha-activity measuring instrument. May 1945. 10p photos, drawings, graph, table Mi $1.25 Ph $1.25 (Limited supply mimeo $.10)
(Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)
I. Atomic power—Research 2. Instruments, Measuring 3. Alpha rays—Measurements 4. AECD 2051

LEATHER AND LEATHER PRODUCTS

PB 95832

Marshall, Charles B.

Determination of toxicity of leather tanned by the sulfonyl chloride process. Nov 1948. 1p Mi $1.25 Ph $1.25
I. Leather—Tanning 2. Leather—Tests

PB 94743

Norlin, Evert

Jämförande undersökning av bottenläders nötningshallfasthet. 1943. 13p photo, drawing, tables (Text in Swedish) Mi $1.75 Ph $2.50
I. Leather, Shoe—Sweden 2. Sweden. Statens Provningsanstalt, Stockholm. Meddelande 92

LUMBER AND WOOD PRODUCTS

PB 94787

Forssblad, Lars

Effects of wind, waves, and current on floating timber. 1947. 72p photos, map, graphs, tables Mi $3.50 Ph $10.00

I. Acta polytechnica no. 15, 1947

The investigation described in this paper chiefly comprises determination of the forces due to wind, waves and current acting on a log floating on the surface of the water. The velocity of a floating log with different wind and current velocities was obtained by tests in a hydraulic channel equipped with fan and by field measurements. In the hydraulic channel, the effect of the wind on the velocity of water was investigated. Wave observations in flowing and non-flowing water were also made in this channel. The investigation comprises also measurements of forces required for warping or towing round-boom rafts for different wind and current velocities. Acta polytechnica No. 15, 1947.

PB 94796

Giertz, Hans Wilhelm

Bestäminin av restlignin. En kolorimetrisk metod för kontroll av blekningsförloppet. 1945. 5p graphs, table (Text in Swedish) Mi $1.25 Ph $1.25

Abstracts in English and German

Svenska Träforskningsinstitutet. Träkemi och Papersteknik. Meddelande 7

The amount of residual lignin in bleached pulp may be determined by dissolving the pulp in sulphuric acid of 76%. If the dissolution be carried out with certain precautions, a colorimetric measurement of the resulting brown colouring will give a numerical expression for the residual lignin. The extinction, $\frac{lo}{l}$ is called residual lignin number. These colorimetric determinations of the residual lignin have proved to be a suitable means of control in bleaching operation. A definite relation exists between the whiteness of the pulp and the residual lignin number.

PB 94822

Giertz, Hans Wilhelm

Blekningskemiens nuvarande ståndpunkt. 1948. 13p (Text in Swedish) Mi $1.75 Ph $2.50

Abstract in English

Svenska Träforskningsinstitutet. Träkemi och Papersteknik. Meddelande 34

The present status of the chemistry of bleaching is reviewed. Bleaching operations are primarily considered to be continued dissolution of the lignin. Theoretical aspects of bleaching with reference to chlorine, hypochlorite, chlorine dioxide and chlorite are given, including the chemical reactions of these agents with the lignin as well as the carbohydrate constituents. In this connection mention is made of the effect of the bleaching on the quality of the pulps. The difference between sulphite and sulphate pulps and the effect of the cooking upon the degree of condensation of the lignin and thuse on the bleachability is also described.

PB 94794

Giertz, Hans Wilhelm

Om massans eftergulning. 1945. 7p graphs, tables (Text in Swedish) Mi $1.25 Ph $1.25

Abstracts in English and German

Svenska Träforskningsinstitutet. Träkemi och Papersteknik. Meddelande 6

Accelerated aging of pulp was carried out by heating samples at 120° C for 16 hours in a ventilated drying oven. The yellowing effect was determined by reflectivity measurements before and after aging. The values obtained were expressed as the $\frac{s}{r}$ number according to Kubelka and Munk and the degree of yellowing was expressed as the difference between these numbers. The discoloration of a bleached pulp cannot be traced to any decomposition products of lignin and the resins are responsible to some extent only. The main cause lies in the products formed by decomposition of carbohydrates during the bleaching. It is therefore important to carry out the bleaching under as mild conditions as possible. For this purpose chlorine dioxide has proved to be a suitable bleaching agent since no products are formed, which would cause yellowing. Some of the wood polyoses of hemicellulose cause a pronounced yellowing effect. These wood polyoses are present in strong sulphite pulp, but are rare in very soft sulphite pulps which have been treated fairly efficiently with alkali between the bleaching stages. Sulphate pulps do not contain such polyoses. A normal sulphite pulp, therefore, is always subject to a certain degree of yellowing, while carefully bleached sulphate pulps are quite resistant. The degradation products formed during the bleaching may be dissolved to some extent by means of alkali. Acidifying the pulps after the bleaching will increase the yellowing and is thus detrimental when such future effect are to be avoided.

PB 94797

Hägglund, Erik

Allmän översikt över verksamheten vid Svenska Träforskningsinstitutets Träkemiska avdelning och cellulosaindustriens centrallaboratorium under År 1945. 1946. 14p drawings, graphs, tables (Text in Swedish) Mi $1.75 Ph $2.50

Abstracts in English and German

Svenska Träforskningsinstitutet Träkemi och Papersteknik. Meddelande 9

The planning for the buildings and equipment of the technical departments of the Swedish Wood Research Institute has finally been concluded after much discussion involving many changes. These departments consist mainly of the central laboratories for the cellulose, paper, wallboard, groundwood and

graphic industries. Two years ago, the author presented before this Association the plans which had been worked out at that time. At present, the technical departments are placed in separate buildings, except that the cellulose department and the graphic section have been housed in the same building. In this way it was possible to place the heavy constructions required to support machinery apart from sections which are to contain laboratories having only light equipment. The cellulose department of the central laboratories is described in detail.

PB 94792

Hägglund, Erik

Kort översikt över forskningsverksamheten vid CCL, STFI:s Träkemiska avdelning och KTH:s cellulosalaboratorium under 1944. 1945. 3p (Text in Swedish) Mi $1.25 Ph $1.25
Svenska Träforskningsinstitutet. Träkemi och Pappersteknik. Meddelande 3

PB 94575

Harris, Elwin E. and others.

Hydrolysis of wood in a stationary digester by successive treatments with dilute sulfuric acid. Sep 1944. 34p drawing, tables Mi $2.25 Ph $5.00 Mimeo: $1.00
Cellulose and hemicellulose in wood are hydrolyzed by the action of dilute sulfuric acid at elevated temperatures into simple sugars, some of which may be fermented to produce industrial ethyl alcohol. The hydrolysis proceeds slowly, and the simple sugars decompose readily. It is necessary, therefore, to remove the sugars as rapidly as possible after they are formed. Mill waste from 12 varieties of softwoods, 4 varieties of hardwoods, and the residue from the solvent extraction of longleaf pine stumps was hydrolyzed in a pilot plant in 400-pound charges. Yields of total reducing sugars from softwoods, such as Douglas-fir, spruce, and Southern yellow pine, ranged from 45 to 57 percent of the weight of the wood; from hardwoods, such as oak and maple, 45 to 52 percent; and from turpentine-spent chips 35 to 37 percent. The time required for the hydrolysis and extraction in several instances was as low as 2.7 hours. Sugar concentrations greater than 6 percent were obtained without loss in yield. The sugar solutions were neutralized with lime and fermented, producing beers containing as high as 2.9 percent alcohol by volume. The yield of alcohol per ton of wood ranged from 40 to 60 gallons from softwoods and from 33 to 42 gallons from hardwoods.

PB 95501

Hearmon, R. F. S.

The elasticity of wood and plywood. 1948. 87p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.70

1. Plywood—Elasticity 2. Wood—Elasticity 3. DSIR FPR SP7

PB 94781

Hellström, Nils

On distillates from wood. 1947. 13p tables Mi $1.75 Ph $2.50

Soluble wood tar was divided into three parts. One (α) distillable and humifiable on treatment with acids, one (β) distillable but not humifiable, one (γ) not distillable. The humifiable substances in tar originate from (α) but also from (γ), which consists of partly humificated substances. In (α) pyrocatechol which plays an important role in the humification process, methylcyclopentenolone, maltol and presumably 5-hydro-oxymethylfurfuraldehyde, furfuraldehyde, acetol, guajacol were present and in (β) levulinic acid, glycollic acid and hydro-oxyvalerolactone and in (γ) laevoglucosan. A hypothesis as to the facility with which tar can be humified is presented. Acta Polytechnica No. 9, 1947.

PB 94795

Lange, Paul

Ultraviolettabsorption av fast lignin. 1945. 5p photos, diagrs, graphs (Text in Swedish) Mi $1.25 Ph $1.25

Abstracts in English and German
Svenska Träforskningsinstitutet. Träkemi och Pappersteknik. Meddelande 5
Progress on the work concerning the ultra violet absorption spectra of native lignin in spruce wood is briefly reported. The distribution of the lignin in the cell wall has been determined photographically. The total percentage of lignin in the wood has been calculated from the evidence thus obtained. The values varied between 27 and 30%. Further, the dichroism of lignin in UV-light has been the object of comprehensive studies and has been identified essentially as self-dichroism, indicating at least a partial orientation of the lignin accumulated in the cell walls. Consequently, the existence of some sort of bond between lignin and cellulose seems highly probable. The dimensions of the elementary cells of the lignin model, dihydro-dehydro-diisoeugenol, has been determined by means of X-ray data. Evidence has been deduced to show that no appreciable changes of the lignin constitution take place in the course of digestion according to the sulphite process. The orientation of the lignin gradually disappears during the sulphite process until—at the point of accomplished disintetration—complete disorder prevails. The ≫ bonding ≫ effect of lignin appears to be a function of the existing degree of orientation. Investigations of the distribution of the lignin in the course of a sulphite cook show that the lignin is attacked over the middle lamella and not over the lumen.

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PB 94565

Luxford, R. F. and Krone, R. H.

End joints of various types in Douglas-fir and white oak compared for strength. Aug 1946. 54p photos, drawings, tables Mi $2.75 Ph $7.50

The growing scarcity of large structural members of suitable quality is rapidly leading to an increase in the use of glued laminated members. Structural members are often of such length that end joints in laminations are necessary. Little is known of the strength of various types of joints, and it was the purpose of this study, performed at the Forest Products Laboratory, to obtain such information. Both Douglas-fir and white oak were used in the study. The types of joints investigated included: plain scarf joints of slopes of 1 in 3, 1 in 6, 1 in 10, 1 in 12, 1 in 15, and 1 in 20, serrated scarf joints, square-toothed scarf joints, fingered joints, and "Onsrud" joints. Tension and compression strengths parallel to the grain were determined. For each specimen with a joint a carefully matched control specimen was tested. The tension specimens with plain scarf joints and the corresponding control specimens had a minimum cross section of 1/4 by 1/2 inch and were so shaped that the 1/2-inch dimension was radial to the growth rings to include the maximum number of annual rings. The minimum section of the tension specimens with serrated scarf, square-toothed scarf, fingered, and Onsrud joints was 3/4 by 1 or 1-1/8 inches. The corresponding controls were of the same shape as specimens with plain scarf joints. The compression tests were made on specimens with serrated scarf, square-toothed scarf, and fingered Onsrud joints and on corresponding controls. These were approximately 3/4 by 1-3/4 inches in cross section and about 4 inches long. The serrated scarf, square-toothed scarf, Onsrud, and most fingered joints were made by Gamble Brothers of Louisville, Kentucky. A few of the fingered joints were made by the Speedwall Division of Timber Structures, Inc., Seattle, Washington. The plain scarf joints were made either at the Laboratory using a resorcinol glue hardened with formaldehyde or at the Speedwall Division of Timber Structures, Inc., Seattle, Washington, using a resorcinol glue hardened with paraform and under the supervision of a Laboratory representative. The plain scarf joints varied greatly in tensile strength. Douglas-fir with a scarf joint of slope of 1 in 3 was on the average deficient by 45 percent; those with a slope of 1 in 6, about 23 percent; those with a slope of 1 in 10, about 10 percent; and those with a slope of 1 in 20 about 5 percent compared to corresponding controls. Similarly, white oak with plain scarf joints of a slope of 1 in 3 was on the average deficient by about 60 percent; those with a slope of 1 in 6, about 27 percent; those with a slope of 1 in 10, about 14 percent; and those with a slope of 1 in 20, about 5 percent. That an efficiency of 100 percent in tension may be impossible even with very flat slopes is indicated by the fact that specimens with plain scarf joints sloping at 1 in 20 failed at lower stresses than the matched controls, although practically none of the failures were in the joint. The same conclusion is suggested by the fact that in an end joint part of the cross-sectional area of the summerwood, which is of high strength, is joined to springwood, which is much lower in strength. Similar reasoning would apply to the strength in shear parallel to the grain of a glued joint between two pieces of edge-grained lumber and to end joints in longitudinal compression. It is most valid for coniferous woods and ring-porous hardwoods in both of which the annual layers consist of two parts differing in structure and density. The serrated scarf, square-toothed scarf, fingered, and Onsrud joints were all less efficient in tensile strength than a plain scarf joint of a slope of 1 in 10 or flatter. The serrated joints had an efficiency of about 50 to 75 percent, the Onsrud joints only about 25 percent, and the fingered joints 20 to 45 percent depending upon the type. These several types of joints have as their purpose the saving of lumber by reducing the length of joint, together with avoidance of the necessity of applying lateral or transverse pressure by clamps or press during the curing of the glue. Some of them, such as the fingered types, are obviously deficient in strength because of the ineffectiveness of the parts of the cross section at the ends of the fingers. The compression strengths of serrated, square toothed, and Onsrud joints in both Douglas-fir and white oak were close to 100 percent. The fingered joints were also close to 100 percent for white oak in this property and about 75 percent efficient for Douglas-fir compared to corresponding controls.

PB 95436

Northeastern Wood Utilization Council, New Haven, Conn.

Wood notes No. 6. Oct 1948. 4p Mi $1.25 Ph $1.25

PB 94817

Pehrson, Stig

Slemproblem vid ett tidningspappersbruk. 1947. 13p tables (Text in Swedish) Mi $1.75 Ph $2.50

Abstracts in English and German

Svenska Träforskningsinstitutet. Träkemi och Pappersteknik. Meddelande 29

Microbiological analyses of slime spots and lumps from the paper machines in a combined mechanical pulp and news paper mill showed the flora of these samples to be composed mainly of fungal diaspores. Fungi dominated even on cultural media for bacteria and at temperatures unfavourable for fungal growth. Capsulated bacteria were not encountered. Dominating organism in slime was LECYTOPHORA LIGNICOLA NANNF. followed by CLADOSPORIUM SP. The ability of these organisms to form slime is discussed in the light of experience from culturing fungi. Local conditions are the chief factor determining the

type of slime. Total number of diaspores in the pulp system was counted at different places in the groundwood mill. The amount of diaspores increased continuously from the grinders to the stock chest. The different carriers of infection are compared in order to allow successful slime control. The once chlorinated and filtered fresh water from the main was rechlorinated in the mill and pumped to a water storage tank. The first chlorination brought about a general reduction of the microflora in the raw water. The rechlorination increased the residual chlorine but it was immediately used up by contact with the pulp suspension and was of no importance for the slime control. Small amounts of diaspores entered the mill with the fresh water. Blueing fungi were more resistant to chlorine than other organisms. Experiments on a large scale confirmed previous statements that the pulp is sterile immediately after hot-grinding. There was no sign of infection in the grinder pit which could have been expected from slime or water draining along the sides of the magazines in the continuous grinders. The mill air was a considerable source of infection by bacteria judged by sediment experiments. Fungal diaspores were scarce in the mill air. At the charging floor and deckers blueing fungi were more frequent. The infection of the system by adding foreign wet pulp, in particular groundwood pulp, in the beaters is important. A comparison between the sources of infection shows the predominant importance of the white water. Probably no growth of organisms takes place in the white water at the prevailing temperatures but slime accumulations on the walls of chutes, chests and the flume will supply the white water with diaspores. Finally some aspects are given concerning control of slime. The common wash-ups reduce the total number of diaspores but after some days slime builds up again. The sterilizing effect of a further increase of the temperature in the white water system is discussed. The possibilities of using antibiotics for controlling slime are mentioned. Results of an investigation concerning the effect and use of some improved chemical desinfectants recommended for the paper industry will be published shortly.

PB 94745

Thunell, Bertil

Beräkning av tryckta strävor av furuvirke med hänsyn till virkets kvalitet. (Effect of the quality of the timber on the stresses to be allowed in posts and struts of redwood exerted to axial loading). 1944. 26p photos, diagrs, graphs, tables (Text in Swedish) Mi $2.00 Ph $3.75

Summary in English

Sweden. Statens Provningsanstalt, Stockholm. Meddelande 90

Tests have been made in the Wood-Laboratory of the Swedish Government Testing Institute with Swedish redwood in commercially sawn dimensions in order to determine the effect the quality and the condition of the timber have upon the compression-strength at different slenderness ratios. The most important strength properties σK and $\sigma K''$ (average and minimum of the ultimate compression strength) σS and $\sigma S''$ (average and minimum of the compression stress at the limit of notable lateral buckling or at which notable influence of the time of loading occurs) are defined and their dependence of the knot ratio sum k_3 and moisture content u in percentage of the dry weight at different slenderness ratios, is shown in tabular form. The knot ratio is the relation between the equivalent knot diameter and the dimension of the side containing the knot. The equivalent knot diameter is the geometric mean of the knot dimensions a and c according to fig. 6. The knot ratio sum is the maximum sum of the knot ratios on a length equivalent to thrice the smallest side.

PB 94746

Thunell, Bertil

Kvalitet och hallfasthet hos virke. 1942. 17p photos, diagrs, graphs, tables (Text in Swedish) Mi $1.75 Ph $2.50

1. Timber—Quality—Sweden 2. Timber—Strength—Sweden 3. Sweden. Statens Provningsanstalt, Stockholm. Meddelande 89

PB 85273

U. S. Army Air Forces.

Set: Woodworking, engineering shops. Feb 1947. 5p tables Mi $1.25 Ph $1.25

1. Woodworking industry—Equipment

MACHINERY (EXCEPT ELECTRICAL)

PB 94757

Almlöf, Erik and Ohlson, Nils-Erik

Handledning i användning av täckdikesplogar. (Instructions in the use of draining plows). 1947. 29p photos, drawings (Text in Swedish) Mi $2.00 Ph $3.75

Summary in English

1. Plows, Drainage—Sweden 2. Drainage—Sweden 3. Jordbrukstekniska Institutet, Ultuna, Uppsala, Sweden. Meddelande 209

PB 94760

Alwerud, Sv. and Andersson, Yngve

Skötsel och justering av självbindare. 1947. 74p photos, drawings (Text in Swedish) Mi $3.50 Ph $10.00

1. Harvesters—Sweden 2. Jordbrukstekniska Institutet, Ultuna, Uppsala, Sweden. Meddelande 206

PB 94773

Dreyfus, L. A.

Three-dimensional theory of turbine flow and its application to the design of wheel vanes for Francis and propeller turbines. 1947. 115p drawings, graphs, tables Mi $4.75 Ph $15.00

Along the mean lamina of flow, $F(z, r) = \Phi$, between neighbouring wheel vanes, a stream line, Ψ = const, with component velocities c_z, c_r, $w_u = c_u - \omega r$ agrees with the differential equation

$$c_z r \frac{\partial \beta}{\partial z} + c_r r \frac{\partial \beta}{\partial r} - w_u = 0$$

The higher the number of vanes the closer the flow will approach an axisymmetrical distribution. This quality, distinctly characteristic of the type of flow in all reaction turbines is adequately expressed by the differential equation

$$\frac{\partial c_z}{\partial m} r \frac{\partial \beta}{\partial z} + \frac{\partial c_r}{\partial m} r \frac{\partial \beta}{\partial r} - \frac{\partial w_u}{\partial m} = 0$$

from which the new three-dimensional theory of turbine flow is deduced. Considering the real flow as irrotational, general formulae are obtained for the derivatives

$$\frac{\partial c_z}{\partial \Phi}, \frac{\partial c_r}{\partial \Phi}, \frac{\partial w_u}{\partial \Phi}, \frac{\partial p}{\partial \Phi} = \left[\frac{\partial (c_u r)}{\partial \beta} \right] \Psi = \text{const}$$

Thus reliable laws for the distribution of velocities and pressure (p) are established and the design of the vane shape, the cavitation problem, the flow and losses at part gate are successfully dealt with by new analytical and graphical methods. Acta polytechnica No. 1, 1947.

PB 94756

Englund, Eric

Den ekonomiska betydelsen av forskning och tekniska framsteg i jordbruket. 1947. 26p photos, graphs, tables (Text in Swedish) Mi $2.00 Ph $3.75

1. Agricultural engineering—Sweden 2. Jordbrukstekniska Institutet, Ultuna, Uppsala, Sweden. Meddelande. 210

PB 94749

Gradin, Harry

Lantbrukets transportfläktar. (Farm transport blowers). 1948. 40p drawings, graphs, tables (Text in Swedish) Mi $2.25 Ph $5.00

Summary in English

1. Blowers, Transport 2. Jordbrukstekniska Institutet, Ultuna, Uppsala, Sweden. Meddelande. 217

PB 94753

Jirlow, Ragnar

Plogmodeller fran 1700-talet vid lantbrukshögskolan studier i maskintekniska institutionens modellsamling. (Plough models from the 18th century exhibited at the Royal Agricultural College Ultuna, Sweden). 1948. 70p photos, drawings, tables (Text in Swedish) Mi $3.00 Ph $8.75

Summary in English

1. Plows—Sweden 2. Jordbrukstekniska Institutet, Ultuna, Uppsala, Sweden. Meddelande. 213

PB 94759

Jordbrukstekniska Institutet, Ultuna, Uppsala, Sweden. Meddlande. 207

Jordbrukstekniaak Institutets Arsberättelse 1945-1946. 1947. 19p drawing (Text in Swedish) Mi $1.75 Ph $2.50

1. Agricultural engineering—Sweden

PB 94754

Jordbrukstekniska Institutet, Ultuna, Uppsala, Sweden. Meddelande. 212.

Jordbrukstekniska Institutets Arsberättelse 1946-1947. 1947. 14p tables (Text in Swedish) Mi $1.75 Ph $2.50

1. Agricultural engineering—Sweden

PB 94763

Jordbrukstekniska Institutet, Ultuna, Uppsala, Sweden. Meddelande. 203

Svensk standard för harvar med fjädrande pinnar. 1946. 22p drawings, tables (Text in Swedish) Mi $2.00 Ph $3.75

Summary in English

1. Harrows—Sweden

PB 94764

Lönnemark, Henning

Handledning for maskinhallare, maskinbolag och maskinföreningar. 1946. 61p photos, drawings, tables (Text in Swedish) Mi $3.00 Ph $8.75

Summary in English

1. Machinery, Farm—Sweden 2. Jordbrukstekniska Institutet, Ultuna, Uppsala, Sweden. Meddelande. 202

PB 94752

Lönnemark, Henning and others.

Hur kostnader och taxor för maskinarbeten i Jordbruket beräknas. 1948. 34p tables (Text in Swedish) Mi $2.25 Ph $5.00

1. Machinery, Farm—Sweden 2. Jordbrukstekniska Institutet, Ultuna, Uppsala, Sweden. Meddelande. 214

PB 94765

Lönnemark, Henning

Undersökning rörand maskinstationer och deras verksamhet. 1945. 62p tables (Text in Swedish) Mi $3.00 Ph $8.75

Summary in English

1. Machinery, Farm—Sweden 2. Jordbrukstekniska Institutet, Ultuna, Uppsala, Sweden. Meddelande. 201

PB 94779

Lundberg, G. and Palmgren, A.

Dynamic capacity of rolling bearings. 1947. 53p diagrs, graphs, tables Mi $2.75 Ph $7.50

The classical theory of strength cannot satisfactorily explain fatigue of materials at intense stress concentrations, and earlier efforts to find

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a general theory for the dynamic capacity of rolling bearings have not been successful. In the article, the foundation is laid for a statistical theory of fatigue, considering the dispersion in strength of material and the dependence of the strength of a volume element on the depth below surface. In this way a general theory is developed for the dynamic capacity of different types of rolling bearings and for equivalent radial and thrust loads under different loading and running conditions. The theory agrees with tests run at SKF. Acta polytechnica No. 7, 1947.

PB 94751

Persson, Sverker and Ohlson, Nils-Erik
Täckdikning med grävmaskin av grävskopetyp. (Trench digging by universal excavator). 1948. 27p photos, drawings, tables Mi $2.00 Ph $3.75
Summary in English
I. Jordbrukstekniska Institutet, Ultuna, Uppsala, Sweden. Meddelande. 215 2. Excavating machinery—Sweden 3. Trenches—Sweden

PB 95288

U. S. Air Force and U. S. Navy Dept.
Pump: 1/2 GPM ac 3000 PSI power driven hydraulic. Air Force-Navy aeronautical standard. Oct 1948. 1p Mi $1.25 Ph $1.25
I. Pumps, Hydraulic

PB 95289

U. S. Air Force and U. S. Navy Dept.
Pump: 1 GPM at 3000 PSI power driven hydraulic. Air Force-Navy aeronautical standard. Sep 1948. 1p Mi $1.25 Ph $1.25
I. Pumps, Hydraulic

PB 95295

U. S. Air Force and U. S. Navy Dept.
Pump-2 GPM at 3000 PSI power driven hydraulic. Air Force-Navy aeronautical standard. Oct 1948. 1p drawings Mi $1.25 Ph $1.25
I. Pumps, Hydraulic

PB 95293

U. S. Air Force and U. S. Navy Dept.
Pump: 3 GPM at 3000 PSI power driven hydraulic. Air Force-Navy aeronautical standard. Oct 1948. 1p drawings Mi $1.25 Ph $1.25
I. Pumps, Hydraulic

PB 95291

U. S. Air Force and U. S. Navy Dept.
Pump: 4 GPM at 3000 PSI power driven hydraulic. Air Force-Navy aeronautical standard. Sep 1948. 1p drawings Mi $1.25 Ph $1.25
I. Pumps, Hydraulic

PB 95290

U. S. Air Force and U. S. Navy Dept.
Pump: 6 GPM at 3000 PSI power driven hydraulic. Air Force-Navy aeronautical standard. Sep 1948. 1p Mi $1.25 Ph $1.25
I. Pumps, Hydraulic

PB 94721

U. S. Air Force and U. S. Navy Dept.
Pumps: Hydraulic hand. Air Force-Navy aeronautical bulletin. Sep 1948. 2p tables Mi $1.25 Ph $1.25
I. Pumps, Hydraulic

PB 88282r

U. S. Air Force.
Turbo jet and gas turbine engines: Equipment comprising "complete turbo jet and gas turbine engines". Mar 1948. 1p Mi $1.25 Ph $1.25

PB 85269

U. S. Army Air Forces.
Set: Shop, machine, engineering shops. Feb 1947. 7p tables Mi $1.25 Ph $1.25
I. Tools, Machine

PB 87733

U. S. Army Air Forces.
Set: Shop, machine, materials experimentation. Feb 1947. 26p tables Mi $2.00 Ph $3.75
I. Materials, Aircraft—Testing equipment 2. Machine shop practice—Testing equipment

PB 95079

U. S. Bureau of Ships.
Master parts book: Internal combustion engines. General Motors—series "71". Aug 1948. 174f Mi $6.50 Enl Pr $23.75
I. Engines, Internal combustion—Maintenance and repair 2. General Motors Corp., Detroit, Mich. 3. Micro NAVSHIPS D-6126, Frames unnumbered

PB 95084

U. S. Bureau of Ships.
Parts and instruction books: Internal combustion engine. Model: American locomotive 539, 540. May 1945. 535f Mi $9.00 Enl Pr $7.00
I. Engines, Internal combustion—Maintenance and repair 2. American Locomotive Co., New York, N. Y. 3. Micro NAVSHIPS D-6081, Frames unnumbered

PB 95080

U. S. Bureau of Ships.
Parts and instruction books: Internal combustion engine. Model: Auto engine, Bacharach Buda Chris craft. Mar 1945. 733f Mi $9.00 Enl Pr $96.25
I. Engines, Internal combustion—Maintenance and repair 2. Bacharach Industrial Instrument Co., Pittsburgh, Pa. 3. Buda Company, Harvey, Ill. 4. Chris-Craft Corps., Algonac, Mich 5. Micro NAVSHIPS D-6032, Frames unnumbered

PB 95535

U. S. Bureau of Ships.
Parts and instruction books: Internal combustion engines. Models: Caterpillar D3400, 8800, 34-15, 88-50, 4600, 11000, 46-30, D4, D6. Jul 1945. 1240f Mi $9.00 Enl Pr $160.00
I. Engines, Internal combustion—Maintenance and repair 2. Caterpillar Tractor Co., Peoria, Ill. 3. Micro NAVSHIPS D-6076, Frames unnumbered

PB 95082

U. S. Bureau of Ships.
Parts and instruction books: Internal combustion engines. Models: Cummins "H" and 60Kw. gen. sets; Enterprise DMG6. Mar 1945. 797f Mi $9.00 Enl Pr $105.00
I. Engines, Internal combustion—Maintenance and repair 2. Cummings Engine Co., Columbus, Ind. 3. Enterprise Foundry Co., San Francisco, Cal. 4. Micro NAVSHIPS D-6035, Frames unnumbered

PB 95083

U. S. Bureau of Ships.
Parts and instruction books: Internal combustion engine. Models: General Motors 1-71, 3-71, 8-268, 8-268A, 16-278A; Fairbanks Morse 38D8 1/8. Mar 1945. 855f Mi $9.00 Enl Pr $112.50
I. Engines, Internal combustion—Maintenance and repair 2. General Motors Corp., Detroit, Mich. 3. Micro NAVSHIPS D-6029, Frames unnumbered

PB 95077

U. S. Bureau of Ships.
Parts and instruction books: Internal combustion engines. Models: Hudson "Invader" 168; Gray Marine 64-HN9; Reel D 6039. Apr 1945. 504f Mi $9.00 Enl Pr $67.50
I. Engines, Internal combustion—Maintenance and repair 2. Hudson Motor Car Co., Detroit, Mich. 3. Gray Marine Motor Co., Detroit, Mich 4. Micro NAVSHIPS D-6039, Frames unnumbered

MEDICAL RESEARCH AND PRACTICE, INCLUDING CLINICAL APPLICATION OF DRUGS AND PHARMACEUTICALS

PB 95691

Büchner, Franz and others.
General pathology, Part I. (FIAT Review of German Science 1939-1946). 1948. 187p (Text in German) Mimeo: $3.00 Mi $6.75 Ph $23.75
I. Pathology—Germany

PB 95685

Büchner, Franz and others.
General pathology, Part II. (FIAT Review of German Science 1939-1946). 1948. 208p (Text in German) Mimeo: $3.00 Mi $7.50 Ph $26.25
I. Pathology—Germany

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PB 95672

Büchner, Franz and others.
Special pathology, Part I. (FIAT Review of German Science 1939-1946). 1948. 201p (Text in German) Mimeo: $3.00 Mi $7.50 Ph $26.25
I. Pathology—Germany

PB 95673

Büchner, Franz and others.
Special pathology, Part II. (FIAT Review of German Science 1939-1946). 1948. 240p (Text in German) Mimeo: $3.00 Mi $8.25 Ph $30.00
I. Pathology—Germany

PB 95381

Cantril, S. T. and Parker, H. M.
Tolerance dose. Jan 1945. 23p graph, tables Mi $2.00 Ph $3.75 (Limited supply mimeo $.15) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.15)
I. Atomic power—Research 2. Dosimetry 3. MDDC 1100

PB 95674

Eichholtz, Fritz and others.
Pharmacology and toxicology. (FIAT Review of German Science 1939-1946). 1948. 241p (Text in German) Mimeo: $3.00 Mi $9.00 Ph $31.25
I. Pharmacology—Germany 2. Toxicology—Germany

PB 95365

Failla, G. and others.
Measurement of tissue dose of ionizing radiation: I. Beta ray emitting isotopes uniformly distributed in a homogeneous tissue. Dec 1947. 4p Mi $1.25 Ph $1.25 (Limited supply mimeo $.05) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)
I. Atomic power—Research 2. Dosimetry 3. Radiation—Physiological effects 4. AECD 2142

PB 95886

Golub, Orville J.
Acquired resistance of psittacosis virus to sulfadiazine and effects of chemical antagonists on sulfonamide activity. Jun 1948. 22p charts Mi $2.00 Ph $3.75
I. Psittacosis—Therapy 2. Sulfadiazine—Uses 3. Sulfanamides—Bacterial action

PB 95885

Heinmets, F. and Golub, O. J.
Observations on the growth of psittacosis virus in chorioallantoic membranes by electron microscope. May 1948. 25p illus, graph Mi $2.00 Ph $3.75
I. Psittacosis—Virus—Culture

PB 95884

Henry, Jane and others.
Studies on streptomycin. III. The effect of streptomycin on the metabolism of resting bacteria and on certain isolated enzymes. n.d. 39p tables Mi $2.25 Ph $5.00
I. Streptomycin—Analysis

PB 95382

Hodge, Harold C. and others.
Beryllium symposium. Dec 1946. 68p tables Mi $3.00 Ph $10.00 (Limited supply mimeo $.25)
(Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.25)
I. Atomic power—Research 2. Beryllium—Toxicity 3. AECD 1803

PB 95675

Kleinschmidt, Hans and others.
Pediatrics. (FIAT Review of German Science 1939-1946). 1948. 243p (Text in German) Mimeo: $3.00 Mi $9.00 Ph $31.25
I. Pediatrics—Germany

PB 95669

Lenhartz, Emil and others.
Physiological and pathological chemistry including nutrition. (FIAT Review of German Science 1939-1946). 1948. 348p (Text in German) Mimeo: $3.00 Mi $9.00 Ph $42.50
I. Nutrition—Germany 2. Physiological chemistry—Germany 3. Chemistry, Medical and pharmaceutical

PB 95690

Martius, Heinrich and others.
Obstetrics and gynaecology, Part I. (FIAT Review of German Science 1939-1946). 1948. 293p (Text in German) Mimeo: $3.00 Mi $9.00 Ph $36.25
I. Obstetrics—Germany 2. Gynaecology—Germany

PB 95689

Nauck, E. G. and others.
Tropical medicine and parasitology. (FIAT Review of German Science 1939-1946). 1948. 25 p (Text in German) Mimeo: $3.00 Mi $9.00 Ph $32.50
I. Medicine, Tropical—Germany 2. Parasitology—Germany 3. Tropical diseases—Germany 4. Hygiene, Tropical—Germany

PB 94880

Parker, H. M.
Radiation hazards of bremsstrallung. Apr 1944. 8p diagr, graph, table Mi $1.25 Ph $1.25 (Limited supply mimeo $.10)

—62133

(Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)
I. Atomic power—Research 2. X-ray spectra 3. Radiation—Physiological effects 4. MDDC 1012

PB 95678

Schaltenbrand, Georg and others.
Neurology, Part I. (FIAT Review of German Science 1939-1946). 1948. 15p (Text in German) Mimeo: $3.00 Mi $6.00 Ph $20.00
I. Neurology—Germany

PB 95686

Schaltenbrand, Georg and others.
Neurology, Part II. (FIAT Review of German Science 1939-1946). 1948. 267p (Text in German) Mimeo: $3.00 Mi $9.00 Ph $32.50
I. Neurology—Germany

PB 95683

Schoen, Rudolf and others.
Internal medicine, Part II. (FIAT Review of German Science 1939-1946). 1948. 288p (Text in German) Mimeo: $3.00 Mi $9.00 Ph $36.25
I. Medicine, Internal—Germany

PB 95368

Suter, George M.
Response of hematopoietic system to X-rays. Apr 1947. 8p graphs Mi $1.25 Ph $1.25 (Limited supply mimeo $.10)
(Also available from U. S. Atomic Enerby Commission, Oak Ridge, Tenn. Mimeo: $.10)
I. Atomic power—Research 2. X-rays—Therapeutics 3. MDDC 824

PB 95888

Wagner, John C. and Golub, Orville J.
Cross-immunity studies between virus strains in the psittacosis-lymphogranuloma venereum group. May 1948. 15p tables Mi $1.75 Ph $2.50
I. Immunity—Research 2. Psittacosis—Virus—Disinfection 3. Lymphogranuloma venereum—Immunity

PB 95889

Wagner, John C. and Golub, Orville J.
Purification of psittacosis virus by alcohol precipitation and centrifugation. May 1948. 14p tables Mi $1.75 Ph $2.50
I. Psittacosis—Virus—Disinfection

PB 94459

Chiarito, Patrick T.

Some strength tests of stiffened curved sheets loaded in shear. Apr 1944. 10p photos, drawings, tables Mi $1.25 Ph $1.25

Results are presented of strength tests of a number of curved-sheet specimens of 24S-T aluminum alloy stiffened longitudinally and transversely and loaded in shear. The specimens were of two related types: curved-web beams and cylindrical shells. NACA L-259.

PB 94514

Eastwood, L. W. and Kempf, L. W.

Aluminum-zinc-magnesium-copper casting alloys. Jul 1941. 30p photos, graphs, tables Mi $2.00 Ph $3.75

The tensile properties and hardness of aluminum-zinc-magnesium-copper alloys containing approximately 0.25 percent chromium and 0.15 percent titanium have been investigated over a range of 0 to 1.75 percent magnesium. The chromium and titanium were added for their specific effects on resistance to corrosion and grain refinement, respectively. Aluminum ingot which contained approximately 0.15 percent iron, 0.08 percent silicon and 99 75+ percent aluminum was used as a base. In sand castings, approximately 0.4 percent copper, 6.6 percent zinc, 0.33 percent magnesium, 0.25 percent chromium, and 0.15 percent titanium appear to give a good combination of strength and ductility together with satisfactory resistance to corrosion. Such an alloy ages at room temperature without any previous heat treatment and attains high tensile properties, endurance limit, resistance to failure by impact, and good resistance to corrosion in the accelerated tests utilized in this investigation. Castings of this type of alloy, however, have the disadvantage of being somewhat "hot short." Its tensile properties at elevated temperatures are relatively low, and it overages with the consequent loss of tensile strength and hardness when exposed for a few months at temperatures as low as 212° F. At 300° F. this overaging effect is rapid with consequent marked deterioration of the tensile properties and hardness. NACA W-31.

PB 94554

Freeman, J. W. and others.

Metallurgical investigation of a large forged disc of CSA (234-A-5) alloy. Oct 1945. 33p photos, diagrs, graphs, tables Mi $2.25 Ph $5.00

It has been found that the properties of heat-resisting alloys are dependent to a considerable extent on the conditions of fabrication. The large size of the forgings for certain types of gas-turbine rotors has introduced fabrication procedures for the alloys for which information is not available. This variable is being investigated for the better alloys. The present report is the second of a series to be issued on this subject. The first report covered a similar investigation of a 19-9 DL alloy disc. (See reference 1.) The principal results obtained from the study of a 20 1/8-inch diameter by 3 5/16-inch thick disc of CSA alloy in the asforged and stress-relieved condition with a surface Brinell hardness ranging from 212 to 255 were:

A. Yield Strengths

	(psi)
0.02% offset at room temperature	40,600
0.2% offset at:	
room temperature	61,300
1200° F	40,000
1350° F	34,500

B. Rupture-Test Characteristics

Stress, psi, to cause rupture at indicated temperatures in:

	(1200° F)	(1350° F)
10 hours	42,000	25,500
100 hours	35,500	19,000
1000 hours	30,000	12,500

The elongation and reduction of area of the fractured specimens were high.

C. Total Deformation Characteristics at 1200° F

Stress, psi, to cause indicated total deformations in:

	(0.1%)	(0.2%)	(0.5%)	(1.0%)	(transition to third-stage creep)
10 hours	15,750	25,000	30,000	33,500	.....
100 hours	13,000	21,000	27,500	30,000	32,000
1000 hours	10,250	17,000	25,000	26,500	26,000

D. Creep Strength at 1200° F

	(psi)
Stress for a creep rate of:	
0.01 percent per 1000 hours	9,000
0.10 percent per 1000 hours	21,000

E. Uniformity

The properties of the disc were uniform for a forging of the size considered, although they were somewhat higher at the surface and rim due to a small amount of cold work.

F. Stability

The material was quite stable at 1200° F except for some loss in impact strength during creep tests. Structural instability was the cause of low strength at 1350° F.

The tensile and rupture strength were low in comparison to previous data on bar stock. This was attributed to lack of hot-cold work as shown by the low hardness, and probably to the composition of the heat being low in carbon and high in columbium. The rupture strength at 1350° F were similar to previous data for bar stock. The rupture and creep

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strengths were somewhat lower than were found for a 19-9 DL alloy disc in a similar condition of fabrication. The time-deformation strengths and short-time tensile properties were similar for the two discs except that a lower stress caused third-stage creep in the CSA alloy. Some improvement in load-carrying ability might be obtained by adjustment of chemical composition. It is probable, however, that the development of strength characteristics equivalent to those previously obtained in bar stock for time periods up to 1000 hours at 1200° F would require that such large discs be cold-worked. Equipment and procedures for this purpose have recently been developed. NACA W-73.

PB 81593

Great Britain Ministry of Supply.

Low pressure flexible oxygen tubing, Mark V. Material specification. Mar 1945. 4p drawings Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.35

1. Tubing, Flexible—Great Britain.

PB 95679

Hansen, Max and others.

Non-ferrous metallurgy, Part 1. (FIAT Review of German Science 1939-1946). 1948. 207p (Text in German) Mimeo: $3.00 Mi $7.50 Ph $26.25

PB 94518

Hartmann, E. C. and Reedy, J. F.

Effect of various surface conditions on press fits of steel bushings and 17S-T aluminum-alloy fittings. Dec 1942. 15p photos, graphs, tables Mi $1.75 Ph $2.50

Specimens of 17S-T aluminum-alloy fittings with pressed-in steel bushings were tested for various surface conditions. The maximum load required to insert the bushing into the fitting was measured when both surfaces were bare, when the 17S-T was anodically coated and the steel cadmium-plated, and when either surface was treated and the other bare, both without lubrication and with Gredag No. 83 as a lubricant. Coefficients of friction for the various press fits were determined from these loads and from the calculated pressures on the specimens. Use of anodic coating on the aluminum-alloy fitting reduced the load required for a press fit to less than one-half and use of cadium plating on the steel bushing, to less than one-third the load required when both surfaces were bare. The use of the lubricant was very beneficial when both surfaces were bare but had little effect for the other surface conditions. NACA W-35.

PB 94402

Lundquist, Eugene E. and others.

Column and plate compressive strengths of aircraft structural materials 23S-T aluminum-alloy sheet. Jun 1945. 42p photos, diagrs, graphs, tables Mi $2.50 Ph $6.25

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Column and plate compressive strengths of 24S-T aluminum-alloy sheet were determined both within and beyond the elastic range from tests of thin-strip columns and from local-instability tests of formed Z- and channel-section columns. These tests are the first of a series in an extensive research investigation to provide data on the structural strength of various aircraft materials. The results, which are presented in the form of curves and charts that may be used in the design and analysis of aircraft structures, supersede preliminary results published previously. NACA L-190.

PB 94521

Russell, H. W. and Jackson, L. R.

Progress report on fatigue of spot-welded aluminum. Feb 1943. 47p photos, graphs, tables Mi $2.50 Ph $6.25

This report contains a detailed account of approximately half of the work planned on Contract NAW 1659. The work on this contract called for fatigue tests on three simple but basic types of spot-welded test pieces made from 24S-T alclad. These were: (1) A sheet lap joint to be loaded in repeated tension. (2) A stiffened panel to be loaded in repeated compression. (3) A nonstressed attachment joint, the sheet to be loaded in repeated tension but no load on the attachment. The fatigue tests were to be run on Krouse direct repeated stress machines. Since this type of fatigue machine is of recent design and has not had the history of service which, for example, characterizes the R. R. Moore type rotary-beam machines, it was felt desirable to spend considerable time in calibrating and studying the characteristics of the machine. In the course of this study, equipment utilizing SR-4 type strain gages was designed and constructed for studying the dynamic characteristics of the machine. The calibration of the machines and the stress-measuring equipment are described in the report. Results obtained so far on lap joints can be summarized as follows: 1. Three typical types of failure were observed: (a) On all static tension tests and on some high-load fatigue tests, failure was by shear through the spots. (b) On some high-load fatigue tests, spots failed by pulling buttons. (c) On all low-load fatigue tests, failure was by cracks in the sheet originating at the spots and extending from spot to spot. 2. On static tension tests, the load-bearing ability in pounds per spot was the same for a spot spacing of 3/4 inch as for one of 1 1/4 inches; however, on fatigue tests, the 3/4 inch spacing was weaker in pounds per spot. 3. Tests run at different ratios of minimum to maximum stress indicated that the stress range allowable for a given life falls off as the mean stress is increased. Results of tests on stiffened panels can be summarized as follows: 1. The stiffened panels consisted of hat-shaped stiffeners spot-welded to sheets and were so designed that

failure was by buckling of the sheet rather than by Euler-column failure of the structure as a whole. The buckling produced tension-type failures in the spot welds. 2. Two thicknesses of stiffened sheet were investigated (0.051 in. and 0.032 in.) and two spot spacings (1 1/4 in. and 3/4 in.). All tests so far were run at a ratio of minimum to maximum load of 0.25. Except at high loads, where the life was less than 100,000 cycles, the thick sheet withstood higher loads than the thin sheet and, in all cases, the test pieces with 3/4-inch spot spacing were stronger than those with 1 1/4-inch spot spacing. 3. At a life of 2 X 10^6 cycles, the 0.051 sheet withstood loads of about 62 percent of its static strength, and the 0.032-inch sheet withstood loads of 41 percent of its static strength. At a life of 100,000 cycles, the 0.032-inch panels had a strength of over 70 percent of the static strength while the 0.051-inch sheet withstood 68 percent of its static strength; thus, for relatively high loads, the thinner panels were as effective as the thicker ones. No tests have yet been run on the unstressed attachments. The report contains a detailed account of methods of obtaining the results and a further discussion of their significance. NACA W-38.

PB 86295r2

U. S. Air Force and U. S. Navy Department.

Tolerances: Aluminum and magnesium alloy extruded rod, bar and shapes. Air Force-Navy aeronautical design standard. Sep 1948. 2p drawings, tables Mi $1.25 Ph $1.25

PB 85258

U. S. Army Air Forces.

Set: Heat treating, engineering shops. Feb 1947. 2p tables Mi $1.25 Ph $1.25

PB 91870

U. S. Bureau of Ships.

Materials for gas turbines operating at 1500° F, test B-3254. May 1947. 47 p photos, graphs, tables Mi $2.50 Ph $6.25

A new cast alloy designated as the "J" alloy has been developed using the original Co-Cr-Mo base Vitallium as a starting point. A wide range of carbon contents were tried which established the optimum content at about 0.76 percent. A wide variety of alloying element combinations shows the large improvements possible starting with the simple Vitallium composition. At all carbon values from about .2 percent up to the maximum the J alloy shows the best rupture properties in the overall range of 1350 to 1800° F over previous Co-Cr alloys reported in the literature. It is stronger than any of the forged alloys at 1350° F. With correct casting control very good reproducibility of test results has been achieved. Optimum aging treatments are shown for the J and other alloys in the same system. The use of .1 to .7 percent Cerium Mischmetall did not improve the rupture life of the J alloy or of the high carbon N-155 cast alloy (95 NT-2) at temperatures of 1500 to 1800° F. Results were generally poorer at 1700 and 1800° F. Creep values for the 73J alloy at 1500° F are shown and are equal to the other best Co-Cr alloys but are poorer than the values obtained with Ni-Cr-Co-Fe base alloys such as N-155.

PB 94517

Walton, C. J. and Keller F.

Procedure used at aluminum research laboratories for determining type of attack in some aluminum alloys. Aug 1942. 14p photos, tables Mi $1.75 Ph $2.50

Representative samples of 17S-T and 24S-T aluminum alloys were subjected to accelerated corrosion tests in which the corrosion period was established at 6 hours for samples that had been etched to produce a uniform surface. The results show the types of corrosion attack, which are described in standard terminology, and may form a basis for estimating the resistance of the material to corrosion by a comparison of the relative depth and frequency of the corrosive attacks. NACA W-34.

METEOROLOGY AND CLIMATOLOGY

PB 89311

Asknazii, A. I.

Cloudiness of Kislovodsk and of Sedlovaya Mountain in relation to tropospheric air masses. 1934. 42f tables Mi $2.50 Enl Pr $7.50

I. Clouds—Russia 2. Fronts (Meteorology)—Russia

PB 89313

Asknazii, A. I.

On the problem of long range weather forecasting. Meteorology and hydrology, 1938, no 1, Jan, p 21-28. Jan 1938. 18f Mi $1.75 Enl Pr $3.75

I. Weather forecasting, Long range—Russia

PB 89314

Babikov, M. and others.

Meteorology for aviators. Moscow, Military publishing house of the Peoples' commissariat for the defense of the U.S.S.R., 1941. 1941. 120f diagrs, graphs, tables Mi $4.75 Enl Pr $16.25

I. Meteorology—Russia

PB 89318

Belyakov, M. V.

Weather service in the U.S.A. Meteorology and hydrology, 1939, no 2, Feb p 129-130. Feb 1939. 4f Mi $1.25 Enl Pr $2.50

I. Meteorology—Russia

PB 89321

Berg, L. S.

Fundamentals of climatology. 2nd ed rev and suppl. Chapters 6-9. Leningrad 1938.

Geographic-economic research institute. 173f tables, graphs Mi $6.50 Enl Pr $23.75
1. Climatology—Russia

PB 89321s

Berg, L. S.
Fundamentals of climatology. 2nd ed rev and suppl. Chapter 10. Leningrad 1938. Geographic-economic research institute. 187f map, graphs, tables Mi $6.75 Enl Pr $25.00
1. Climatology—Russia

PB 89321s2

Berg, L. S.
Fundamentals of climatology. 2nd ed. rev. and suppl. Chapters 12-14. Leningrad 1938. Geographic-economic research institute. 1938. 178f graphs, tables Mi $6.50 Enl Pr $23.75
Supplement 2 to PB 89321
1. Climatology—Russia

PB 89325

Blinova, E. N.
Hydrodynamic theory of pressure and temperature waves and centers of action of the atmosphere. August 1942. Aug 1942. 13f Mi $1.75 Enl Pr $3.75
1. Atmosphere—Temperature—Russia
2. Hydrodynamics—Russia

PB 89335

Budyko, M. I.
Turbulent exchange in the lower layers of the atmosphere. Meteorology and hydrology, 1946, no 2, p 33-43. 1946. 20f Mi $1.75 Enl Pr $3.75
1. Atmosphere—Disturbances—Russia

PB 89338

Bugaev, V. A. and Dezhordzhio, V. A.
Classification of the air masses of the U.S.S.R. Meteorology and hydrology, 1940, v 6, no 12, p 33-45. 1940. 19f maps, tables Mi $1.75 Enl Pr $3.75
1. Fronts (Meteorology)—Russia

PB 89336

Bugaev, V. A.
Relationship between the cyclonic trajectories and the position of Artic front in winter. Meteorology and hydrology, 1936, no 8, p 11-18. 1936. 17f maps Mi $1.75 Enl Pr $3.75
1. Cyclones—Research—Russia

PB 89343

Byzov, N. P.
Some peculiarities in the distribution of winds over Ashkhabad, according to data of pilot balloon observations for the year 1928. Ashkhabad, Turkoman State publishing house, 1929. U.S.S.R. Turkoman Soviet Socialist Republic. Peoples' commissariat for agriculture. Turkoman meteorological bureau. 1928. 24f graph, tables Mi $2.00 Enl Pr $5.00
1. Winds—Direction—Russia

PB 89344

Byzov, N. P.
Some remarks on the question of using baric topographic charts in synoptic practice. Meteorology and hydrology, 1939, no 3, March p 28-44. Mar 1939. 39f diagr, maps graph, tables Mi $2.25 Enl Pr $6.25
1. Topographical charts—Russia

PB 89349

Dezhordzhio, V. and Bugaev, V.
Classification of central Asiatic air masses. Meteorology and hydrology, 1936, no 6, June p. 72-74. 1936. 9f tables Mi $1.25 Enl Pr $2.50
1. Fronts (Meteorology)—Russia

PB 89350

Dezhordzhio, V. A. and others.
Weather types of Central Asia. Journal of geophysics, 1935, v 5 no 2, p 163-201. 1935. 74f graphs, tables Mi $3.50 Enl Pr $11.25
1. Weather—Central Asia

PB 89351

Diubiuk, A.
Review of application of synoptic methods to the study and characterization of climate by G. Y. Vangeneim. Meteorology and hydrology, 1936, v 2, p 91-93. 1936. 13f Mi $1.75 Enl Pr $3.75
1. Climatology—Russia

PB 89353

Diubiuk, A. F. and Dzerdzeyevskii, B. L.
Handbook of local weather indications; based on the work of A. F. Dybyuk, supplement by B. L. Dzerdzeyevskii. Moscow, Sverdlovsk, Hydrometeorological publications, 1943. U.S.S.R. Peoples' Commissariat for the Defense of the U.S.S.R. Chief Administration of the hydrometeorological service of the Red army. 1943. 206f maps Mi $7.50 Enl Pr $27.50
1. Weather forecasting—Russia

PB 95502

Dixon, F. E.
The Aurora of January 25 to 26, 1938 and associated magnetic storm. 1948. 18p illus, charts, diagrs. Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.70
1. Aurora borealis 2. Storms, Magnetic
3. Gt. Brit. Air Ministry. Meteorological Office

PB 89355

Dubentsov, V. R. and Vitvitskaia, Z. M.
Manual: Construction and analysis of synoptic maps and aerological charts and diagrams. Mos

Sverdlovsk. Hydrometeorological publishing house, 1943. U.S.R. Peoples' commissariat for the defense of the U.S.S.R. Chief administration of the hydrometeological service of the Red army. Central weather institute. 1943. 199f maps, tables Mi $7.00 Enl Pr $26.25
1. Weather charts—Russia 2. Aerology—Russia

PB 89359

Epifanskii, G.
Computation of the wind aloft in advance. Weather, 1941, no 7, Apr., p 14-15. 1941. 12f Mi $1.75 Enl Pr $3.75
1. Winds—Russia

PB 89368

Golman, S.
Synoptic conditions associated with the breakthrough of southern cyclones into the territory of Kazkhstan and Western Siberia in the summer half of the year. Meteorology and hydrology, 1939, no 1, p 36-46. 1939. 26f maps, tables Mi $2.00 Enl Pr $5.00
1. Cyclones—Russia

PB 89374

Iaroslavtsev, I. M.
Materials for the typification of synoptic processes over central Asia. Meteorology and hydrology, 1939, no 10-11, Oct-Nov p. 45-56. 1939. 26f maps Mi $2.00 Enl Pr $5.00
1. Meteorology—Russia
2. Hydrology—Russia

PB 89375

Iaroslavtsev, I. M.
Some peculiarities of synoptic analysis in central Asia. Meteorology and hydrology, 1939, no. 6, June, p 26-33. Jun 1939. 14f maps Mi $1.75 Enl Pr $3.75
1. Meteorology—Central Asia

PB 89377

Iaroslavtsev, I. M.
Transformation of air masses over Tashkentom. Meteorology and hydrology, 1940, no 5-6, May-June p 38-47. 1940. 31f maps, graphs, tables Mi $2.25 Enl Pr $6.25
1. Atmosphere—Circulation—Russia
2. Meteorology—Russia

PB 89490

Ignekoff (Mr.) and others.
Manual of climatology. Leningrad, 1940. 1940. 820f diagrs, graphs, tables Mi $9.00 Enl Pr $105.00
1. Climatology—Russia

PB 89379

Ivanov, B. G.
Evaporation under natural conditions, methods of study and results attained. Leningrad, Moscow, Hydrometeorological publications, 1939. 1939. 295f maps, graphs, tables Mi $9.00 Enl Pr $38.75
1. Evaporation—Research—Russia

PB 89382

Izvekov, B. I. and others.
Dynamic meteorology, part I. Leningrad, 1935. U.S.S.R. Chief administration of the United Hydrometeorological service, 1935. Central geophysical observatory. 1935. 18f tables Mi $1.75 Enl Pr $3.75
1. Meteorology—Russia

PB 89384

Kalinovsky, A. B. and others.
Use of aerological data in weather analysis and forecasting. Moscow, Hydrometeorological publications, 1939. U.S.S.R. Council of peoples' commissars, Chief administration of the hydrometeorological service. Central weather institute. 1939. 119f maps, tables Mi $4.75 Enl Pr $16.25
1. Weather forecasting—Russia 2. Aerology—Russia

PB 89387

Kashin, K. I.
Brief instructions for the diagnosis and forecast of temperature, pressure and wind velocity aloft. Averdlovsk, Moscow, Hydrometeorological publications, 1942. U.S.S.R., Chief administration of the hydrometeorological service of the Red army, Central weather institute and Central geophysical observatory. 1942. 47f diagrs, graphs Mi $2.50 Enl pr $7.50
1. Wind—Velocities—Russia 2. Atmosphere—Pressure—Russia 3. Atmosphere—Temperature—Russia

PB 89388

Kashin, K. I.
Handbook for the construction and analysis of vertical cross sections of the atmosphere. Moscow, Hydrometeorological publishing house, 1940. U.S.S.R. Council of peoples' commissars. Chief administration of the hydrometeorological service. Central weather institute. 1940. 45f Mi $2.50 Enl Pr $7.50
1. Atmosphere—Analysis—Russia

PB 89399

Khromov, S. P.
Synoptic meteorology. n.d. 11f Mi $1.75 Enl Pr $3.75
1. Meteorology—Russia

PB 89400

Khromov, S. P.
Training atlas of synoptic charts. Parts I and II. Moscow, Hydrometeorological publications, 1938 and 1941. 1938-1941. 72f Mi $3.50 Enl Pr $11.25
1. Weather charts—Russia

PB 89402

Kibel, I.

Hydromechanics and the forecast of weather. Weather, 1941, no 6, Mar., p 1-2. 1941. 9f Mi $1.25 Enl Pr $2.50

1. Weather forecasting—Russia 2 Hydromechanics—Russia

PB 89401

Kibel, I. A.

Equations for the mechanics of baroclinic fluids as applied to meteorology. Bulletin of the academy of sciences of the U.S.S.R. Geographical and physical ser., 1940. 1940. 20f maps Mi $1.75 Enl Pr $3.75

1. Meteorological research—Russia

PB 89403

Kibel, I. A.

Observations on the theory of thermal turbulence in the atmosphere. Meteorology and hydrology, 1946, no 2, p 25-32. 1946. 9f tables Mi $1.25 Enl Pr $2.50

1. Atmosphere—Disturbances—Russia

PB 89406

Klyucharev, S. S.

Methods of analysis of temperature variations in the atmosphere. Meteorology and hydrology, 1940, no 9, Sep, p 12-22. Sep 1940. 24f maps, tables Mi $2.00 Enl Pr $5.00

1. Atmosphere—Temperature—Russia

PB 89407

Klyucharev, S. S.

Tentative analysis of temperature variations in the troposphere. Meteorology and hydrology, 1940, no 10, Oct., p 32-37. Oct 1940. 18f maps, graphs Mi $1.75 Enl Pr $3.75

1. Troposhere—Russia 2. Atmosphere—Temperature—Russia

PB 89411

Koloskov, P. I.

Climatic description of southern Sakhalin. Leningrad, Moscow, Editorial publishing section of the Hydrometeorological service of the U.S.S.R., 1936. U.S.S.R. Chief administration of the hydrometeorological service. Central geophysical observatory. 1936. 50f graphs, tables Mi $2.50 Enl Pr $7.50

1. Sakhalin—Climate—Russia

PB 89410

Koloskov, P. I.

Climatic sketch of Kamchatka peninsula. Records of the far eastern geophysical institute, 1932, issue 11, Nov. Nov 1932. 49f tables Mi $2.50 Enl Pr $7.50

1. Kamchatka peninsula—Climate

—62133

PB 89417

Kurganskaya, V. M.

Synoptic conditions associated with instrusion of southern cyclones resulting in blizzards along the railroads of western Siberia and Kazakhstan. Meteorology and hydrology, 1936, no 1, Jan, p 18-40. 1936. 66f maps Mi $3.00 Enl Pr $10.00

This report may not reproduce well.

1. Cyclones—Russia

PB 89420

Kuznetsov, N. N.

Contribution to the theory of foehn. Meteorology and hydrology, 1940, no. 11, November, p 30-43. Nov 1940. 31f Mi $2.25 Enl Pr $6.25

1. Winds—Russia 2. Currents, Air—Russia

PB 89422

Lir, E.

Basic feature of the atmpspheric circulation in the warm half of the year. Preliminary account. Journal of geophysics, 1933, v 3, issue 4, p 440-450. 1933. 19f Mi $1.75 Enl Pr $3.75

1. Atmosphere—Circulation—Russia

PB 89423

Lir, E. S.

Basic features of the winter synoptic process in the northern hemisphere. Journal of geophysics, 1932, v 2, issue 3-4, p 350-375. 1932. 28f Mi $2.00 Enl Pr $5.00

1. Weather—Russia

PB 89421

Lir, E. S.

Basic traits of the seasonal air circulation over the southeast of the European part of the U.S.S.R. Meteorology and hydrology, 1940, no 5-6, p 24-37. 1940. 40f Mi $2.25 Enl Pr $6.25

1. Atmosphere—Circulation—Russia

PB 89426

Loris-Melikov, M. A.

Evaluation of short-term forecasts. U.S.S.R. Central geophysical observatory. Bulletin, 1927, no 1, p 19-25. 1927. 10f tables Mi $1.25 Enl Pr $2.50

1. Weather forecasting—Russia

PB 89440

Malik, S. A.

Masking of fronts in the Caucasus. Meteorology and hydrology, 1939, n. 6, p 34-45. 1939. 14f Mi $1.75 Enl Pr $3.75

1. Fronts (Meteorology)—Russia

PB 94731

Melin, R.

Undersökningar vid Sveriges Meteorologisha och Hydrologisha Institut över vattendragens

isförhallanden. 1947. 49p photos, maps, graphs, tables (Text in Swedish) Mi $2.50 Ph 6.25
Summary in English
1. Ice conditions—Sweden
2. Sveriges Meteorologiska och Hydrologiska Institut, Stockholm. Meddelanden, ser. D, no. 1

PB 89445

Mikhel, V. M.
Calculation of ballistic wind in the absence of pilot balloon observation data. U.S.S.R. Headquarters of the hydrometeorological service of the Red army. Main geophysical observatory. n.d. 65f tables Mi $3.00 Enl Pr $10.00
1. Winds—Direction—Russia 2. Winds—Velocity—Russia 3. U.S.S.R. Central Bureau of the Hydrometeorological

PB 95680

Mügge, Ratje and others.
Meteorology and physics of the atmosphere. (FIAT Review of German Science 1939-1946). 1948. 291p (Text in German) Mimeo: $3.00 Mi $9.00 Ph $37.50
1. Meteorology—Germany 2. Atmosphere—Germany 3. Weather—Germany

PB 89454

Multanevskii, B. P.
Riddle of the Arctic. Sketch. Meteorological herald, 1926, no 1 Jan, p 2-17. Jan 1926. 5f Mi $1.25 Enl Pr $2.50
1. Meteorology—Arctic region—Russia

PB 89455

Mul'tanovskii, B. P.
Winter of 1929-30 from a synoptic point of view. Nature, 1930, no 3, p 287-308. 1929—1930. 21f Mi $2.00 Enl Pr $5.00
1. Weather—Russia

PB 89462

Obolenskii, V. N.
Meteorology, part 1, chap 1-2. Leningrad, 1938-1939. 260f diagrs, tables Mi $9.00 Enl Pr $33.75
1. Meteorology—Russia

PB 89462s

Obolenskii, V. N.
Meteorology, part 1, chapters 3-4. Leningrad, 1938-1939. 199f graphs, tables Mi $7.00 Enl Pr $26.25
Supplement 1 to PB 89462
1. Meteorology—Russia

PB 89462s2

Obolenskii, V. N.
Meteorology, part 1, chap 5-7. Leningrad, 1938-1939. 312f graphs, tables Mi $9.00 Enl Pr $41.25
Supplement 2 to PB 89462
1. Meteorology—Russia

PB 89462s3

Obolenskii, V. N.
Meteorology, part 1, chap. 8-9. Leningrad, 1938-1939. 211f graphs, tables Mi $7.75 Enl Pr $28.75
Supplement 3 to PB 89462
1. Meteorology—Russia

PB 89463

Omshanskii, M. A.
Evolution of effective synoptic weather forecasting. Bulletin of the Academy of Sciences of the U.S.S.R. Geographical and geophysical series, 1943, no 3, 161-172. 1943. 27f tables Mi $2.00 Enl Pr $5.00
1. Weather forecasting—Russia

PB 89466

Pagava, S.
F. Baur's methodics of long range weather forecasts. Weather, 1941, no 8, Apr., p 5-7. Apr 1941. 12f Mi $1.75 Enl Pr $3.75
1. Weather forecasting—Russia

PB 89468

Pagava, S. T. ed.
Basic principles of the synoptic method of long-range weather forecasting. v 1. Leningrad, Moscow 1940. 1940. 149f maps, tables Mi $5.75 Enl Pr $20.00
1. Weather forecasting—Russia

PB 89468s

Pagava, S. T. ed.
Basic principles of the synoptic method of long-range weather forecasting. v 2. Leningrad, Moscow 1940. 1940. 146f maps, tables Mi $5.75 Enl Pr $20.00
Supplement 1 to PB 89468
1. Weather forecasting—Russia

PB 89468s2

Pagava, S. T. ed.
Basic principles of the synoptic method of long-range weather forecasting. v 3. Leningrad, Moscow 1940. 1940. 157f maps, tables Mi $6.00 Enl Pr $21.25
Supplement 2 to PB 89468
1. Weather forecasting, Long range—Russia

PB 89464

Pagava, S. T.
Development of synoptic climatology. Climate and Weather 1936, no 2, 12-14. 1936. 7f Mi $1.25 Enl Pr $2.50
1. Climatology—Research—Russia

PB 89470

Pastukh, V. P.
On the problem of energy possibilities for destroying cold waves. Meteorology and hydrology,

1946 no 2, 6-24. 1946. 13f Mi $1.75
Enl Pr $3.75
1. Climatology—Research—Russia

PB 89481

Pogesian, K. P. and Taborovskii, N. L.
Instructions for synoptic aerological analysis. Moscow, Hydrometeorological publications, 1940. 1940. 94f maps Mi $4.25
Enl Pr $13.75
1. Aerology 2. U.S.S.R. Central Bureau of the Hydrometeorological Service

PB 89482

Pogosian, K. P. and Taborovskii, N. L.
Transformation of air masses and the dynamic of atmospheric processes. Meteorology and hydrology, 1940, no 4. 1940 21f maps, graphs, tables
Mi $2.00 Enl Pr $5.00
1. Fronts (Meteorology) 2. Atmosphere—Circulation

PB 89478

Pogosian, Kh. P. and Taborovskii, N. L.
Aerological conditions of development and extinction of cyclones. Meteorology and hydrology, 1939, no 12, Dec. Dec 1939. 58f Mi $2.75
Enl Pr $8.75
1. Cyclones—Russia

PB 89479

Pogosian, Kh. P. and Taborovskii, N. L.
Average and actual distribution of energy in the atmosphere. Meteorology and hydrology, 1940, no 9, Sep. 1940. 28f tables Mi $2.00
Enl Pr $5.00
1. Atmosphere—Energy—Russia

PB 89480

Pogosian, Kh. P. and Taborovskii, N. L.
Higher level deformation fields and their part in the cyclogenesis and anticyclogenesis. Meteorology and hydrology, 1940, no 4, April. 1940.
34f diagrs Mi $2.25 Enl Pr $6.25
1. Meteorological research—Russia 2. Cyclones

PB 89503

Seloust'yev, A. V.
Forecasting of cyclonic outbreaks from southwestern central Asia on the basis of pilot balloon observations. Meteorology and hydrology, 1938, no 11-12, Nov-Dec., p 67-7. 1938. 17f
Mi $1.75 Enl Pr $3.75
1. Weather forecasting—Russia 2. Weather—Cyclones—Russia

PB 89512

Shtal, V.
Meteorological service of the Workers' and Peasants' Red army. Kiev, State military publications Na Varti, 1936. 1936. 10f diagrs Mi $1.25 Enl Pr $2.50
1. Meteorology—Russia

—62133

PB 89514

Shuleikin, V. V.
Thermobaric seiches in the atmosphere as a factor in weather sequence. Bulletin of the Academy of sciences of the U.S.S.R. Geographical and geophysical series. 1942, p 3-25. 1942.
40f Mi $2.25 Enl Pr $6.25
1. Weather—Russia

PB 89528

Stremoussov, N. V.
Synoptic processes in the eastern part of the Asiatic continent and adjacent seas. Journal of geophysics, 1935, v 5, no 2. 1935. 22f maps, tables Mi $2.00 Enl Pr $5.00
1. Meteorology—Russia

PB 94771

Sveriges Meteorologiska och Hydrologiska Institut, Stockholm.
Arsbok, 27, 1945. 1. Månadsöversikt över väderleken och vattentillgång. 1946. 52p tables (Text in Swedish) Mi $2.75 Ph $7.50
1. Meteorological tables—Sweden

PB 94772

Sveriges Meteorologiska och Hydrologiska Institut, Stockholm. Meddelanden, ser. C, no. 1.
De Svenska vattendragens arealförhållanden: II. Mörrumsån, helgeån, rönneån M. Fl. 1947. 18p maps, tables (Text in Swedish) Mi $1.75
Ph $2.50
1. Meteorology—Sweden

PB 94281

Tolefson, H. B.
Airspeed fluctuations as a measure of atmospheric turbulence. Jul 1945. 16p drawings, graphs, table Mi $1.75 Ph $2.50
Because of the need for a reliable quantitative method of reporting atmospheric turbulence from airplanes in flight, the rapid fluctuations in the pilot's indicated-airspeed readings in rough air were analyzed in relation to control difficulties experienced by the pilot and to structural loads. The data used for this purpose were obtained with the XC-35 airplane in flight through cumulus, cumulus-congestus, and cumulo-nimbus clouds. The rapid fluctuations in the pilot's indicated-airspeed readings were found to apply with small error to the estimation of the structural loads resulting from flight in turbulent air. Data obtained from the airspeed meter, as in the case of acceleration data, however, do not permit accurate estimation of the control difficulties due to atmospheric turbulence that are experienced by the pilot. NACA L-72.

PB 89545
U.S.S.R. Central Bureau of the Hydrometeorological Service.
Handbook for meteorological stations of the third class. 1941. 51f Mi $2.75 Enl Pr $8.75
I. Meteorology—Handbooks—Russia

PB 89541
U.S.S.R. Central Bureau of the Hydrometeorological Service.
Instructional directives for meteorologists of the Central bureau of the meteorological service. Moscow, Hydrometeorological publishing house, 1941. 1941. 54f Mi $2.75 Enl Pr $8.75
I. Meteorology—Russia

PB 89543
U.S.S.R. Central Bureau of the Hydrometeorological Service.
Statute of the Central Bureau of the Hydrometeorological service of the U.S.S.R. of the Council of peoples' commissars of the U.S.S.R. 1939. 22f Mi $2.00 Enl Pr $5.00
I. Hydrometeorology—Russia

PB 89544
U.S.S.R. Central Bureau of the Hydrometeorological Service.
Handbook for meteorological stations of the second class. 6th ed. Part 1. Moscow 1940. 1940. 223f tables Mi $8.00 Enl Pr $30.00
I. Meteorology—Handbooks—Russia

PB 89544s
U.S.S.R. Peoples' Commissariat for the Defense.
Handbook for meteorological stations of the second class, 6th ed. Part 2. Leningrad/Moscow 1940. 77f tables Mi $3.50 Enl Pr $11.25
Supplement 1 to PB 89544
I. Meteorology—Handbooks—Russia

PB 89544s2
U.S.S.R. Peoples' Commissariat for Defense.
Handbook for meteorological stations of the second class. 6th ed. Part 3. Leningrad, Moscow 1940. 1940. 64f Mi $3.00 Enl Pr $10.00
Supplement 2 of PB 89544
I. Meteorological stations—Russia

PB 89546
U.S.S.R. Peoples' Commissariat for the Defense.
Instructions for issuance, verification and evaluation of hydrological forecasts. 1942. 82f Mi $3.75 Enl Pr $12.50
I. Hydrology—Forecasting—Russia 2. U.S.S.R. Central Bureau of the Hydrometeorological Service

PB 89540
U.S.S.R. Peoples' Commissariat for the Defense.
Instructions on the terminology and evaluation of short range weather forecasts by points and areas. Moscow, Leningrad, Hydrometeorological Publishing house, 1941. 1941. 10f tables Mi $1.25 Ph $2.50
I. Weather forecasting—Russia

PB 89555
Vangengeim, G.
Seasonal hydrometeorological forecasts. Weather, 1941 no 6, March p 3-5. Mar 1941. 14f Mi $1.75 Enl Pr $3.75
I. Weather forecasting—Russia

PB 89552
Vangengeim, G. I.
On the question of typization and schematization of atmospheric processes. Meteorology and hydrology, 1938, no 3, Mar, p 38-58. Mar 1938. 40f Mi $2.25 Enl Pr $6.25
I. Atmosphere—Russia

PB 89550
Vangenheim, G. Ia.
Application of synoptic methods to the study and characterization of climate. Moscow, Editing-publishing section of the headquarters of the U.S.S.R. Hydrometeorological service, 1935. 1935. 195f maps, diagrs, graphs, tables Mi $7.00 Enl Pr $26.25
I. Climatology—Research—Russia

MINERALS AND MINERAL PRODUCTS

PB 94593
Bennett, Dwight G.
Ceramic coatings and ceramic bodies for aircraft power systems. Jul 1938. 82p photos, graphs, tables Mi $3.75 Ph $11.25
1. Coatings, Ceramic—Tests 2. Ceramic materials—Tests

PB 93770
Both, Eberhard
Plant scale process for the production of rectangular hysteresis loop magnetic materials. Sep 1947. 7p graphs Mi $1.25 Ph $1.25
This memorandum contains the technical information necessary for the commercial production of a rectangular hysteresis loop magnetic material. The process described is one whereby the grain orientation is obtained by severe cold reduction and subsequent annealing. A 50% nickel-iron alloy of high purity is used.

PB 95437
Duckworth, Winston H.
Ceramic developments for aircraft power plants. Mar 1948. 4p illus Mi $1.25 Ph $1.25
1. Ceramic materials—Research
2. Ceramic materials—Thermal properties
3. Ceramics—High temperature
4. Refractory materials

PB 94531

Geller, R. F. and Burdick, M. D.

Strength and creep of special ceramic bodies in tension at elevated temperatures. Jun 1946. 37p drawings, graphs, tables Mi $2.25 Ph $5.00

1. Blades, Ceramic

This is a progress report of an investigation for the determination of the behavior of ceramic bodies in tension at elevated temperatures for the purpose of determining data essential to the design of ceramic blades for gas turbines. Observations made on six special ceramic bodies covered the determination of their tensile strength, and also their creep during prolonged loading, under stresses ranging from 3000 to 15,000 psi and at temperatures ranging from 1500° to 2230° F. These observations were supplemented by preliminary tests on a large number of bodies to observe their strength in bending at 1800° F, and also their resistance to thermal shock. Preliminary tests in bending at 1800° F gave modulus-of-rupture values for commercial specimens ranging from 4900 to 18,000 psi; for specimens of bodies developed at the National Bureau of Standards, the values ranged from 6000 to 18,000 psi. Young's modulus of elasticity values ranged from 6 X 10^6 to 17 X 10^6 psi for the former group, and from 9 X 10^6 to 31 X 10^6 for the latter group. Preliminary tests for resistance to thermal shock indicate that three of the compositions developed at the National Bureau of Standards, and three commercial compositions, can be quenched 10 times from a furnace held at 1700° F to room temperature in an air blast without loss in strength as determined by modulus of rupture in bending at room temperature. Short-time tensile tests at 1800° F have given somewhat erratic results but tensile strengths in excess of 10,000 psi seem assured. In the creep tests at 1500° F none of the bodies showed sufficient creep, at loads up to failure, to be measurable by the methods employed. Creep at 1800° F and at stresses from 11,000 to 13,000 psi was not excessive for several of the bodies tested. In evaluating these strengths consideration should be given the relative bulk densities of the ceramic materials as compared with those of metallic alloys. NACA W-48.

PB 94777

Holmquist, P. J.

Details of the quartz transformation in silica bricks. 1947. 37p photos, graphs, diagrs Mi $2.25 Ph $5.00

Consists mainly of results of microscopical examinations of silica bricks, with particular regard to the formation of cristobalite. The zoning of transformation products in heated quartz fragments is described. The so-called »Ballenstruktur» (Mügge) or »feintes de retrait» (Le Chatelier) of cristobalite is interpreted as a collodal one. The transformation of quartz can be considerably accelerated by admixtures, such as alkalies or CaO. The appearance of tridymite in silica bricks is interpreted as due to such fluxes, as is also the development of collodal cristobalite. Continued influence of the same factor may cause a reversion from cristobalite to tridymite. Acta Polytechnica No. 5, 1947.

PB 94738

Johannesson, Paul

Lagring av bensin i undervattensbehållare av betong. (Oil storage in submarine concrete containers). 1946. 8p drawings, graphs, tables (Text in Swedish) Mi $1.25 Ph $1.25

Summary in English

1. Sweden. Statens Provningsanstalt, Stockholm. Meddelande 97

Investigations have been made to ascertain firstly the density of water-saturated concrete against petrol at a water pressure up to about 0,5 kg/cm^2 of the petrol, secondly changes in the petrol when stored in concrete containers. 400 litres of petrol were stored for 1 year and 3 months in a container with dimensions and form according to fig. 2. The testing apparatus is shown in fig. 4. The loss of petrol by leakage proved to be extremely small, ca. 0,3 °/oo a year for a total volume of about 400 litres. The leakage occurred at one place only on the wall of the container. A greater loss (ca. 0,8 litre pro m^2 wall-surface) occurred by penetration into the walls, but with continual use of a container this can be counted as a non-recurring loss. The quality of the petrol did not deteriorate, it was rather improved by storage. As was expected, the petrol has no noticeable effect on the quality of the concrete. It was shown by the investigation that concrete containers, which are completely surrounded by water, are suitable for storing petrol, even if the petrol has a certain pressure as against the surrounding water. In such containers the resin-percentage of the petrol is not increased, which is likely due to the fact that the resin-matter formed is neutralized by lime from the water. But the concrete must be made very carefully to avoid penetrating pores, shrinkage cracks etc., through which leakage can occur.

PB 91841

Moss, N.

Preparation of boron-coated ion chambers. Apr 1947. 18p drawings Mi $1.75 Ph $2.50

A static method for the deposition of pure boron on the mild steel electrodes of the type TQT ion chamber is described. The method used depends on the thermal dissociation of diborane at about 500°C. A full account of the preparation of diborane is given.

PB 94744

Nycander, Per

Inverkan av tryckytornas beskaffenhet på kubhållfastheten hos betong. 1943. 10p graphs, tables (Text in Swedish) Mi $1.25 Ph $1.25

I. Concrete—Drying—Sweden 2. Concrete—Strength—Sweden 3. Sweden. Statens Provningsanstalt, Stockholm. Meddelande 91

PB 94736

Nycander, Per

Mo-mätaren. (Mobility tester). 1947. 5p photo, drawings, graph (Text in Swedish)
Mi $1.25 Ph $1.25

Summary in English

I. Sweden. Statens Provningsanstalt, Stockholm. Meddelande 99

Figs. 1 and 2 show an apparatus for determining the mobility of fresh concrete. A test is carried out as follows. The apparatus is filled with concrote to the top edge of the vertical tube. By lightly and repeatedly knocking the apparatus against the floor the concrete is then forced down to approximately half the height of the tube. After refilling the tube with concrete to the top edge the apparatus is repeatedly lifted and allowed to fall 50 mms against a steel plate or a hard sport on the floor. The mobility is given by the number of falls, which are necessary for bringing the concrete surface down to the lower edge of the vertical tube. Fig. 4 shows a similar apparatus for determining the mobility of fresh mortar.

PB 94735

Nycander, Per

Provning av betengblandare. (Testing of concrete mixers). 1947. 27p photo, diagrs, graphs, table (Text in Swedish) Mi $2.00 Ph $3.75

Summary in English

I. Sweden. Statens Provningsanstalt, Stockholm. Meddelande 100

Four types of concrete mixers which are commonly used in Sweden have been tested as regard to the uniformity of the mixture and the quality of the concrete. On the basis of these experiments a proposed standard has been set up for the classification of concrete mixers for building purposes. The four mixers were: one Jäger type (capacity 250 litres), one Smith and two Kaisers (350 litres each). For each type of mixer concrete of four different consistencies were tried and for each consistency two or four batches were made in each mixer. The concrete from each batch was tested as follows. Sieve analyses of the mixtures were made, using 0.5 mm and 8 mm sieves. The compressive strength was determined, using test cubes with length of side 20 cms. The water permeability was determined for two specimens from each of eight batches. For comparison tests were also carried out on concrete mixed in a mixer of the Eirich type. Eight batches were tested in this mixer as regard to strength and permeability. Furthermore strength tests were made for hand-mixed concrete. The test results showed that concrete from the Jäger mixer was not satisfactory. The average strength of concrete from this type of mixer was only 53% of the strength of concrete prepared in the Eirich type. The concrete prepared in the other types of mixers as well as hand-mixed concrete gave as an average about 90% of the strength of concrete prepared in the Eirich mixer. The sieve analysis showed that it mainly was the gravel of larger size than 8 mms., that was not distributed uniformly in the prepared concrete. It was found that the mixing time had little effect on the test result. Thus no difference in strength, permeability or uniformity of mixture was obtained when mixing time was thirty or ninety seconds. A mixing time of only thirty seconds is, however, not advisable in practice as the concrete will not obtain its optimal mobility in such a short time. In further investigations of mixers the mobility of the concrete will also be tested. The proposed standards for classifying mixers refer to concrete of stiff as well as of loose consistency with cement content 275 kilogram per cub. met. and mixing time sixty seconds. To meet the standards a mixer must give concrete with strength at least 80% of the strength of similar concrete prepared in an Eirich mixer with mixing time 5 minutes.

PB 94734

Nycander, Per

Vattentäthet hos betongrör: En undersökning av provningsmetoder. (Water tightness of concrete pipes; Investigation of testing-methods). 1947. 37p photos, graphs, tables (Text in Swedish)
Mi $2.25 Ph $5.00

Summary in English

I. Sweden. Statens Provningsanstalt, Stockholm. Meddelande 101

The method generally applied in Sweden for determination of water-tightness in concrete pipes consists in setting the pipe upright and after providing it with a watertight bottom of cement mortar filling it with water. During the first 24 hours water is added to replace any loss by leakage or seepage. In the following 24 hours the fall in level of the water is measured and this falls is taken as the measure of untightness or leakage in the pipe. In exceptional cases, measurement of the porosity of the concrete is taken instead. These methods have been reviewed from different points of view. In addition the influence of the water pressure on leakage has been investigated. Tests made have shown that leakage in pipes with a moderate tightness is governed by the air humidity and the draught conditions in the testing premises, to such an extent that leakage increases by as much as 60% if the air humidity falls from about 90% to around 50% and 60%. The leakage increases by more than 100% if simultaneously with this fall of air humidity there is a horizontal current of air moving at about 1/2 m per second. Study of the effect of temperature on leakage has shown that rise in temperature does not generally lead to increased leakage. Indeed, it would rather seem as if the opposite was the case. It has not been possible to demonstrate any general connection between

watertightness and porosity, nor has it been possible to indicate any requirement in respect of appropriate maximum porosity. On the basis of the investigations into the influence of the pressure on leakage, an empirical formula has been worked out, which shows that it is only at low pressures that the flow of water in concrete follows the law of flow in fine sand. Strangely enough, at high pressures the flow in concrete increases by the square of the pressure.

PB 91838

Russell, John J.

Colorimetric determination of traces of boron. Aug 1947. 50p graphs, tables Mi $2.75 Ph $7.50

A method has been developed for the analysis of different types of materials for traces of boron. It relies upon the distillation of the boron as methyl borate and its subsequent hydrolysis with sodium hydroxide solution. The boron is determined by means of turmeric, using a Spekker absorptiometer to measure the colour. Difficulties encountered are discussed, and the errors still inherent in the method, so far as known, are pointed out.

ORDNANCE AND ACCESSORIES

PB 94364

Ferri, Antonio

Supersonic-tunnel tests of projectiles in Germany and Italy. Oct 1945. 66p photos, drawings, graphs, tables Mi $3.00 Ph $8.75

Tests were performed in the Göttingen (Germany) and Guidonia (Italy) supersonic tunnels in order to determine the aerodynamic characteristics of projectiles of various shapes. The Mach numbers ranged from about 1.3 to 3.2 for the Göttingen tests and from 1.44 to 2.66 for the Guidonia tests. The results show that increasing the relative length of the nose causes the drag coefficient to decrease and the center of pressure to move forward. For a given length, the nose having minimum drag has a curved profile; the curvature is greatest at the tip and decreases to a very small value toward the rear of the nose, where the shape becomes approximately conical. As the Mach number increases, the drag coefficient decreases and the center of pressure moves toward the tail. For the higher Mach numbers the variation of the drag coefficient and the movement of the center of pressure are small. Existing aerodynamic theory gives values of the aerodynamic characteristics close to those determined experimentally for small flow deviations. NACA L-152.

PB 95378

Mack, J. E.

Semi-popular motion-picture record of the Trinity explosion. Apr 1946. 44p photos only Mi $2.50 Ph $7.50 (Limited supply mimeo $.20)

—62133

(Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.20)

1. Atomic power—Research 2. Bombs, Atomic 3. MDDC 221

PB 95542

U. S. Ordnance Dept.

Outline of function, structure, process of manufacture, and method of inspection of 6.5 mm cartridge for model 38 rifles. Nov 1948. 31p drawings, tables Mi $2.25 Ph $5.00

1. Cartridges, Rifle

PB 89535

U.S.S.R. Peoples' Commissariat for the defense.

Red army artillery manual: Artillery reconnaissance with the aid of instruments, part 5: Artillery meteorological service. Military publications office of the Peoples' commissariat for the defense of the U.S.S.R., 1942. 1942. 230f graphs, tables Mi $8.00 Enl Pr $30.00

1. Artillery—Manuals—Russia

PACKING AND PACKAGING

PB 94015

Clark, Frederick E. and others.

Holding of O-ring packings. Mar 1948. 4p photos, tables Mi $1.25 Ph $1.25

1. Packings, Hydraulic—Rings 2. Battelle Memorial Institute, Columbus, O.

PB 92461r

U. S. Air Force and U. S. Navy Department

Containers: Metal, reusable, interior shipping. Oct 1948. 8p tables Mi $1.25 Ph $1.25

Revision 1 of PB 92461

PB 80552r3

U. S. Air Force

Metal container preservation and packaging. Apr 1948. 6p Mi $1.25 Ph $1.25

PB 85306

U. S. Army Air Forces.

Set: Development, packaging, equipment, ground communications. Feb 1947. 2p tables Mi $1.25 Ph $1.25

1. Electronic equipment—Packaging

PAPER AND ALLIED PRODUCTS

PB 94823

Giertz, Hans Wilhelm

Samband mellan massans och papperets egenskaper. 1948. 12p (Text in Swedish) Mi $1.75 Ph $2.50

Abstracts in English

1. Svenska Träforskningsinstitutet. Träkemi och Papperstek. Meddelande 35

The intimate relation between the properties of paper and the hemicellulose content of the pulp is wellknown. It is questionable, however, whether the hemicellulose from a chemical point of view exhibits paper making qualities, which are specifically different from those characterising pure cellulose. It appears more reasonable to assume, that the effect of hemicullulose is due to its physical occurence as an integrate constituent of the amorphous parts of the fiber wall. This may be traced to the fact that the amorphous parts more easily produce a swelled cellulose gel on beating than parts of highly geometrical order. The amount of carbohydrates of a low packing density thus appears to be of great importance in regard to the ease of beating and the resulting paper properties. Pulps containing large amounts of amorphous cellulose will beat easily and give papers of high density, resulting in high tensile and bursting strength, since these qualities depend on the degree of bonding between the fibers. Grease-proof pulp may be ranged among such pulps. Soft types of paper, having high bulk and porosity, low strength and high opacity are obtained from pulps poor in amorphous cellulose. Bleached kraft pulps as well as strong sulphite pulps refined by alkali treatment belong to this type of pulp and, although difficult to beat, improve the strength and particularly the performance of strength and color. In this respect a striking resemblance with cotton rags is observed. Tearing strength depends largely upon the inherent strength of the fiber and, especially, upon the thickness of the fiber wall. High contents of summer-wood will produce high tearing strength of the pulp. The growth of Scandinavian coniferous woods is favourable for the production of pulps which simultaneously show high tearing and bursting strength.

PB 94790

Grewin, Fredrik and Hägglund, Erik

Svenska träforskningsinstitutet. Föredrag vid Svenska pappers-och cellulosaingeniöreningens vinter mote den 17 Mars 1944. 1945. 24p diagr, drawings (Text in Swedish) Mi $2.00 Ph $3.75

1. Laboratories, Paper making—Sweden 2 Svenska Träforskningsinstitutet. Träkemi och Pappersteknik. Meddelande 1

PB 94821

Ivarsson, Bertil and Steenberg, Börje.

Universalinstrument för draghållfasthetsstudier av papper. 1947. 8p photos, diagrs, graph, table (Text in Swedish) Mi $1.25 Ph $1.25

Abstracts in English and German

1. Svenska Träforskningsinstitutet. Träkemi och Pappersteknik. Meddelande 33

A universal instrument for tensile studies of paper is described. The instrument is of the chainomatic type with photo-electric control and allows recording of stress-strain diagrams at constant rate of elongation or constant rate of loading and further studies of creep and relaxation at constant elongation. The length of the strip under test can be varied up to 750 mm, and is placed in a conditioned cabinet. Elongation can be read to 0,01mm and the stress can in all cases be read to the nearest 7 gr. In fig. 2 the general layout of the instrument is shown and in fig. 1 the balance part is photographed In fig. 3 a detail of the straining part is shown, together with the lower clamp. In fig. 4 and 5 the amplifier for the photo-cell and relays for the balancing are shown. In order to allow automatic recording of both straining and de-straining parts of the diagram the instrument is equipped with contacts (fig. 6) which when touched by a pointer on the chain, reverse the direction of either the elongation or the loading. In fig. 7 is shown the battery of relays which direct these changes. Generally the instrument is used with a constant rate of elongation of $2.67 \cdot 10^{-5}$ per sec. This low rate is needed in de-straining because the rate of creep of the paper is low. The instrument is used for rheologic studies of paper.

PB 94801

Steenberg, Börje

Statistik och provning inom pappersindustrien. 1947. 7p graphs (Text in Swedish) Mi $1.25 Ph $1.25

Abstracts in English and German

Svenska Träforskningsinstitutet. Träkemi och Papersteknik. Meddelande 13

Experience obtained in operation should, if possible, be summarized statistically to avoid subjective interpretation. Such measures will also reduce the danger of loosing accumulated experience when changing personnel. Simple statistical methods in the paper industry are exemplified. The insufficiency of averages is demonstrated. Examination of cumulative values is a valuable means in detecting errors caused by the simultaneous presence of a number of variables. The principles of sequential analysis are described and the advantages of this method are stressed.

PERSONNEL APTITUDE TESTING AND JOB TRAINING

PB 94989

U. S. Air Force.

Set: Instructional, materials testing techniques. Jun 1948. 5p tables Mi $1.25 Ph $1.25

1. Training devices—Testing equipment

PB 94981

U. S. Air Force.

Set: Training, administrative and technical specialized, staff officers. Jul 1948. 4p tables Mi $1.25 Ph $1.25

1. Personnel, Flying—Training

PHOTOGRAPHIC AND OPTICAL GOODS

PB 94969

McGregor, Ransford P.
Helicopter survey methods for mapping: Interim report. Mar 1948. 35p photos, drawing, tables Mi $2.25 Ph $5.00
1. Mapping, Aerial

PB 94858

Rauen, Robert L.
Service test of titlers, aerial roll film identification. Final report. Aug 1948. 20p photos Mi $1.75 Ph $2.50 Mimeo: $1.75
1. Motion pictures—Titling

PB 87721

U. S. Air Force and U. S. Bureau of Aeronautics
Handbook: Operation and service instructions, type O-15 recording camera (35-mm single frame). Dec 1947. 33p photos, drawings, tables Mi $2.25 Ph $5.00
1. Cameras, Recording

PB 87520r

U. S. Air Force and U. S. Bureau of Aeronautics.
Parts catalog: Type D-6 photographic lamp assembly. (Raytheon). Feb 1948. 6p photos, drawings, tables Mi $1.25 Ph $1.25

PB 88289

U. S. Air Force.
Set: Photographic, group and squadron, heavy bombardment. Jan 1948. 6p tables Mi $1.00 Ph $1.00
1. Photographic laboratories—Equipment
2. Photography, Aerial—Equipment

PB 88275

U. S. Air Force.
Set: Photographic, group and squadron, medium bombardment. Jan 1948. 5p tables Mi $1.00 Ph $1.00
1. Photography, Aerial—Equipment

PB 88288

U. S. Air Force.
Set: Photographic, group and squadron, (VH) bombardment. Jan 1948. 5p Mi $1.00 Ph $1.00
1. Photographic laboratories—Equipment
2. Photography, Aerial—Equipment

PB 94978

U. S. Air Force.
Set: Services, auxiliary, photographic and reproduction. Jul 1948. 4p tables Mi $1.25 Ph $1.25
1. Photography, Aerial—Equipment

PB 94990

U. S. Air Force.
Set: Training, individual, photographer. Aug 1948. 6p tables Mi $1.25 Ph $1.25
1. Training equipment—Photographers

PB 81926r

U. S. Air Force.
Set: Training, individual, photographer, aerial. May 1948. 7p tables Mi $1.25 Ph $1.25

PB 85307

U. S. Army Air Forces.
Set: Fabrication, prototype camera and accessory, photographic laboratory. Feb 1947. 13p tables Mi $1.75 Ph $2.50
1. Cameras—Manufacture

PB 85305

U. S. Army Air Forces
Set: Modification and designing, motion picture equipment, photographic laboratory. Feb 1947. 12p tables Mi $1.75 Ph $2.50
1. Cameras, Motion picture

PB 85304

U. S. Army Air Forces.
Set: Research and development, photographic, photographic laboratory. Feb 1947. 10p tables Mi $1.25 Ph $1.25
1. Photographic equipment

PB 85312

U. S. Army Air Forces.
Set: Training, individual, intepreter, photographic. Jul 1947. 2p table Mi $1.25 Ph $1.25
1. Photography, Aerial

PB 87749

U. S. Army Air Forces.
Set: Training, individual, technician, laboratory photographic. Aug 1947. 4p tables Mi $1.25 Ph $1.25
1. Photographic laboratories—Technicians—Training equipment

PHYSICS

General

PB 95670

Bartels, Julius and others.
Geophysics, Part I. (FIAT Review of German Science 1939-1946). 1948. 243p (Text in German) Mimeo: $3.00 Mi $8.25 Ph $30.00
See PB 95676 for Part II

PB 95676

Bartels, Julius and others.
Geophysics, Part II. (FIAT Review of German Science 1939-1946). 1948. 321p (Text in German) Mimeo: $3.00 Mi $9.00 Ph $41.25
See PB 95670 for Part I

PB 94774

Faxén, O. H.

Forces exerted on a rigid cylinder in a viscous fluid between two parallel fixed planes. 1947. 21p diagr, graph Mi $2.00 Ph $3.75

Risistance formulae are calculated under the following assumptions:

I. The cylinder is moving in the fluid parallel to the planes and in the plane midway between them; the fluid is at rest at a distance from the cylinder.

II. The cylinder is fixed in the middle plane, and the fluid is flowing between the planes part the cylinder.

The result is expanded into series of λ, the quotient of the cylinder's diameter and the distance between the planes. The method may also be used in some problems of elasticity. Incidentally, forty roots of the equation $\sinh 2x = 2x$ are calculated to ten places or more. Acta polytechnica No. 2, 1947.

PB 94783

Hallén, E.

Some units in the Giorgi system and the C. G. S. system. 1947. 42p graph, table Mi $2.50 Ph $6.25

Assuming the definition of the electric current unit derived from magnetic forces between currents, the author investigates theoretically which formulation of other magnetic laws are logically possible. The result is that only the unit ampere-square meter and not the voltsecond meter can be used for the magnetic moment and that the oerstedt must be abampere per centimeter. The author described experiments comparing »magnetic pole strength» considered as equal to the B-flux, and »magnetic pole strength» considered as equal to the H-flux. The latter conception is shown to be the correct one. Acta polytechnica No. 11, 1947.

PB 95572

Kirkwood, J. G. and Seeger, R. J.

Surface waves from an underwater explosion. Apr 1948. 15p graphs, tables Mi $1.75 Ph $2.50

Reprint from Journal of Applied Physics, Vol. 19, No. 4, Apr 1948

1. Explosions, Underwater 2 U. S. Naval Ordnance Laboratory

PB 94988

U. S. Air Force.

Set: Instructional, laboratory, physics. Jun 1948. 4p Mi $1.25 Ph $1.25

1. Laboratories, Aeronautical 2. Laboratories, Physics

PB 94778

Watzinger, A. and Lydersen, A.

Heat transfer for liquids in incrusted tubes on cooling and on heating. 1947. 38p photo, drawings, graphs, tables Mi $2.25 Ph $5.00

Tests on 1" steel pipe with NaCl-brine in incrusted and cleaned tubes with Reynold's number Re from 1000 to 64000 and Prandtl's number Pr from 8 to 33. Average brine temperature—15 Centigrade to +26 Centigrade. Results are collected in charts for heat transfer coefficient α as function of Reynold's number Re* and for Nusselt's number Nu as function of Pr. Tests with water show with same roughness and same Pr that the results may be applied to other fluids. Influence of direction of heat flow on heat transfer is discussed in relation to former tests on resistance in pipes. Acta Polytechnica No. 6, 1947.

PB 94784

Werthén, H. and Nilsson, B.

Automatic impedance meter. 1947. 90p photos, diagrs, graphs, tables Mi $3.75 Ph $11.25

Assuming the definition of the electric current unit derived from magnetic forces between currents, the author investigates theoretically which formulation of other magnetic laws are logically possible. The result is that only the unit ampere-square meter and not the voltsecond meter can be used for the magnetic moment and that the oerstedt must be abampere per centimeter. The author described experiments comparing »magnetic pole strength» considered as equal to the B-flux, and »magnetic pole strength» considered as equal to the H-flux. The latter conception is shown to be the correct one. Acta Polytechnica No. 12, 1947.

Nuclear

PB 93202s

Allen, A. O.

Chemical effects of ionizing radiation on simple inorganic compounds and aqueous solutions. Sep 1946. 11p graphs Mi $1.75 Ph $2.50 (Limited supply mimeo $.10)

(Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)

Review of existing data shows that all covalent compounds are decomposed by ionizing radiations, but that for simple molecules the reactions often will not proceed far because of back reaction of product molecules to re-form the original substances. Such systems are characterized by approach to radiation steady states, in which the various possible molecules are all present in proportions which will in general depend on the radiation intensity as well as on other variables. The concept of the constant "ion-pair yield" or "radiation yield" is valid only over restricted ranges for systems far removed from a steady state. New experiments on the decomposition of pure liquid water are described, which show that the water decomposes to hydrogen and hydrogen peroxide or oxygen, but if these products are not continuously removed from the water a steady state is reached at very low product concentrations and decomposition ceases. Statements in the literature,

apparently contradictory, on the radiation stability of water are shown to be reconciled by this scheme. The mechanism of water decomposition is discussed in detail in terms of behavior of free radicals formed by dissociation of the H_2O molecule. These radicals react readily with most solutes, and the decomposition of water by radiation is accordingly greatly affected by traces of dissolved material. Radiation effects in aqueous solutions are discussed in terms of free radical reactions. Applications to systems of biological interest are briefly indicated. MDDC 363, Supp.

PB 95387

Ballenger, H. F.

Polarographic method for the quantitative determination of uranium in atmospheric dust. Aug 1944. 6p Mi $1.25 Ph $1.25 (Limited supply mimeo $.10) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)

The sample of dust is collected and deposited from a known volume of air using a high voltage electrostatic (Cottrell) precipitator in conjunction with an electric vacuum pump. Detailed directions for chemical treatment and polarographic analysis are given. A modified Heyrovsky Polarography Model XI is used. AECD 2065.

PB 95383

Binns, J. E. and others.

Vacuum testing at Sam Laboratories. n.d. 31p photos, drawings, graphs Mi $2.25 Ph $5.00 (Limited supply mimeo $.15) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.15)

1. Atomic power—Research 2. Testing procedures, Vacuum 3. AECD 1814

PB 94871

Borkowski, C. J.

Ionization chamber for carbon-14 measurements. Jun 1947. 4p drawings, table Mi $1.25 Ph $1.25 (Limited supply mimeo $.05) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)

1. Atomic power—Research 2. Ionization chambers 3. MDDC 1099

PB 94867

Burford, W. B.

Development and use of a 600-ampere fluorine cell. n.d. 24p photos, drawing, tables Mi $2.00 Ph $3.75 (Limited supply mimeo $.75) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.75)

1. Atomic power—Research 2. MDDC 635

PB 94879

Burke, J. E.

Investigation of plutonium hydride. May 1944. 2p graph Mi $1.25 Ph $1.25 (Limited supply mimeo $.05) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)

Attempts have been made to prepare plutonium hydride from three different samples of plutonium metal. The first sample did not form hydride. This report gives the results from two later runs. The resulting products corresponded to the following formulae: $PuH_{2.55}$ and $PuH_{2.75}$. AECD 2124

PB 95377

Clinton Laboratories, Oak Ridge, Tenn.

Photographs illustrating production of radioactive materials at Clinton Laboratories. n.d. 32p photos only Mi $2.25 Ph $6.25 (Limited supply mimeo $.15) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.15)

1. Atomic power—Research 2. Radioactive substances—Production 3. MDDC 1330

PB 94884

Coryell, Charles D.

Survey of studies on the valence states of some secondary fission products. Mar 1948. 10p tables Mi $1.25 Ph $1.25 (Limited supply mimeo $.10) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)

Chemical procedures are presented for the identification of the valence distribution of a number of elements when these are present in tracer concentrations. These elements include selenium, bromine, tellurium, iodine, and cerium. These procedures have been used to explore the valence states of Se^{83}, $Te^{(132)}$, and three isotopes of I in typical fission product mixtures. Selenium was found to be 95% selenite and 5% as selenate; tellurium about 65% as tellurite and 35% as tellurate, and iodine in slightly alkaline solution about 45% in reduced states, 45% as iodate, and 10% as periodate (with a higher fraction of reduced states for $I^{(132)}$. Studies of the valence state of 33h Ce^{143} growing from 19m La^{143} in the presence of an adsorbent for ceric tracer showed that over 60% of the newly formed Ce^{143} is in the tetravalent state. Studies of the valence state of Br growing from $Se^{83}O_3^=$, $Se^{83}O_4^=$, and $Se^{84}O_4^=$ indicate that approximately 60% is in reduced states and 40% in the bromate state irrespective of reaction conditions used. Studies on the valence state of 2.4h $I^{(132)}$ growing from 77h $Te^{(132)}$ show ratios of reduced forms to IO_3^- to IO_4^- of 75:14:11 for tellurite decay and 60:28:12 for tellurate decay. Studies on the valence state of 72m Te^{129} formed from isomeric transition of the 32d Te^{129} show that parent tellurate gives 55% daughter tellurite in acid solution and 40% in alkaline solution and that parent tellurite gives no daughter tellurate in acid solution and 14% in alkaline solution. Different effects are noted with isomeric pairs of mass numbers 127 and 131. The decay of 32d Te^{129} in gaseous TeF_6 leads to retention of the 50% of the 72m

daughter in forms volatile at -78° C. Little work has been done previously to determine the valence state of products of nuclear transformation, and there is little basis for prediction of the results. These studies are presented largely from the experimental side. They do not lend themselves readily to broad interpretation. AECD 1824

PB 91844

Davison, B.

Influence of a large black sphere upon the neutron density in an infinite non-capturing medium. Nov 1944. 16p Mi $1.75 Ph $2.50

In the present report we examine the neutron density in a uniform non-capturing medium surrounding a large black sphere, in the case when the density at infinity tends to a definite finite limit. "Large" sphere means large compared to the mean free path of the surrounding medium. The linear extrapolation length λ for the asymptotic solution for the density in the surrounding medium is determined and expressed in terms of the radius of the sphere. The method is essentially as follows. In zero approximation, and not too far from the surface of the sphere the density should be roughly the same as in a half-space bounded by a vacuum. In more accurate approximations, and if we consider any distances from the sphere, the density will deviate from that in the half-space, but these deviations can be split into groups, viz., the primarily long-range effects and the primarily short-range effects. The primarily long-range effects are taken into account automatically if we re-interpret our problem treating the neutron density of the actual problem times the radial coordinate as the neutron density in some fictitious modified problem. The primarily short-range effects can then be treated as a small perturbation, assuming the solution of Milne's problem as the unperturbed system. Evaluating the orders of magnitude of the successive corrections, working out the first few of them and returning to the original interpretation of quantities we have

$$\lambda = 0.7104 + 0.5047\,\frac{1}{a} + 0.2336\,\frac{1}{a^2} - \frac{1}{4a^3}\log a - 0.1704\,\frac{1}{a^3} + O\left(\frac{\log^2 a}{a^4}\right)$$

in which a is the radius of the sphere in terms of the external mean free path. NRCC 1550.

PB 94882

Dessauer, Gerhard and others.

Pressure ionization chamber for the measurement of neutron fluxes at tolerance level in portable instruments. Oct 1945. 12p diagrs, graphs, tables Mi $1.75 Ph $2.50 (Limited supply mimeo $.10) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)

1. Atomic power—Research 2. Neutrons—Counts 3. Ionization chambers 4. AECD 1856

—62133

PB 94870

Dessauer, Gerhard and others.

Radiation dose integrator of high sensitivity. Sep 1945. 8p photos, drawings Mi $1.25 Ph $1.25 (Limited supply mimeo $.10) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)

1. Atomic power—Research 2. Radiation, Integrator 3. AECD 1972

PB 94892

Engineering drawings which can be used in manufacture of a special high vacuum chamber in which materials can be handled: Three drawings. n.d. 24p drawings only Mi $2.00 Ph $3.75 (Limited supply mimeo $.80) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.80)

1. Atomic power—Research 2. Chambers, Vacuum 3. MDDC 2004

PB 94868

Fermi, E. and Marshall, L.

Interference phenomena of slow neutrons. n.d. 39p graphs, tables Mi $2.25 Ph $5.00 (Limited supply mimeo $1.00) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $1.00)

1. Atomic power—Research 2. Neutrons—Interference

PB 94876

Frankel, S. and Fuchs, K.

Comparison of the variation-theory and end-point results for tamped spheres. Jul 1948. 2p Mi $1.25 Ph $1.25 (Limited supply mimeo $.05) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)

The end-point and variation results presented in previous reports are shown to be in agreement throughout that part of the range of applicability of the end-point method (core and tamper thicknesses greater than 0.3 attenuation distances) in which the variation results have been calculated (up to 1.0 attenuation distance). For smaller dimensions the variation results are valid, and for larger sizes the end-point method applies. Large discrepancies are found only for the extrapolated portions of the variation results. AECD 2131.

PB 94878

Frenkel, Albert W.

Effect of uranyl-chloride on the respiration and photosynthesis of chlorella pyrenoidosa. Nov 1947. 5p tables Mi $1.25 Ph $1.25 (Limited supply mimeo $.05) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)

Uranyl-chloride at pH 3.5 - 4.5 was found to inhibit exogenous respiration of glucose by Chlorella, approximatelly 20 percent at a uranium concentration of 10^{-4} M/L and 80 percent at 10^{-3} M/L.

Some stimulation was observed which may be due to uranyl sensitized decomposition of organic compounds liberated by Chlorella cells. AECD 2143.

PB 94887

Hagemann, French

Isolation of actinium (Ac^{227}). Feb 1948. 4p drawings, graphs Mi $1.25 Ph $1.25 (Limited supply mimeo $.10) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)

1. Atomic power—Research 2. Actinium 3. AECD 1933

PB 95386

Hein, R. E. and Voigt, A. F.

Activities produced by bombardment of TiO_2 with pile neutrons. n.d. 6p graphs, tables Mi $1.25 Ph $1.25 (Limited supply mimeo $.10) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)

1. Atomic power—Research 2. Voigt, A. F. 3. Titanium—Analysis

PB 95363

Kilner, Scott B.

Determination of small amounts of uranium by the polarographic method. Nov 1942. 1p Mi $1.25 Ph $1.25 (Limited supply mimeo $.05) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)

1. Atomic power—Research 2. Uranium—Determination 3. Polarographic analysis 4. AECD 2059

PB 95384

Kirshenbaum, I.

Physical properties of heavy water. Jul 1943. 19p graphs, tables Mi $1.75 Ph $2.50 (Limited supply mimeo $.10) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)

1. Atomic power—Research 2. Water, Heavy 3. AECD 1991

PB 94888

MacInnes, D. A. and Longsworth, L. G.

Comparison of analytical methods for the determination of uranium. Nov 1942. 5p tables Mi $1.25 Ph $1.25 (Limited supply mimeo $.05) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)

1. Uranium—Determination 2. Atomic power—Research 3. MDDC 910

PB 95380

Moyer, B. J. and others.

Character of the radiation field and sheilding at the 184-inch cyclotron. Jun 1947. 6p Mi $1.25 Ph $1.25 (Limited supply mimeo $.05) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)

1. Atomic power—Research 2. Cyclotrons 3. Radiation, Field 4. AECD 2149

PB 94877

Nereson, Norris

Disintegration of mesotrons in B^{10}. Jun 1948. 2p table Mi $1.25 Ph $1.25 (Limited supply mimeo $.05) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)

It is evident from the results obtained that no significant difference is present in the delayed or decay electron counting rate from the two boron absorbers, B^{10} and B^{11}. The evidence from these absorbers indicates that the interaction of negative mesotrons with nuclei depends on atomic number. The B^{10} data also provides additional evidence that the capture probability of negative mesotrons is very small in the case of boron. AECD 2098.

PB 94893

O'Connor, Paul R.

Chemical identification of isotopes formed in the bombardment of uranium with high energy particles. Aug 1947. 41p graphs, table Mi $2.50 Ph $6.25 (Limited supply mimeo $.20) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.20)

1. Atomic power—Research 2. Isotopes—Identification 3. Uranium—Bombardment 4. MDDC 1706

PB 94872

Penneman, R. A.

Color production in lithium fluoride by radiation. Mar 9146. 7p graphs, table Mi $1.25 Ph $1.25 (Limited supply mimeo $.10) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)

Crystals of synthetic lithium fluoride are colored by electron, x ray, and pile radiation (neutron). The principal effect of pile radiation is caused by the $Li^6(n,\alpha)H^3$ reaction, and the α and H^3 particles having a total kinetic energy of ~ 4.6 Mev. Qualitatively, the color depends upon the amount of irradiation, and progresses from a light green to a deep red on sufficient exposure. The absorption spectra of these crystals, colored by the various radiations, show discrete bands with peaks at 250, 310, 375, 445, and 550 mμ which are identical in position for the different irradiations, and are identified as F, R, R, M, and F'-bands. Heating at 3000° C restores the original transmission. AECD 1859.

PB 95392

Rall, Wilfrid and Shaw, A. E.

Adjustable electrode arrangement for a spark source mass spectrograph. Jun 1946. 2p drawings Mi $1.25 Ph $1.25 (Limited supply mimeo $.05) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)

1. Atomic power—Research
2. Mass spectrographs
3. MDDC 1106

PB 95391

Rall, Wilfrid and Shaw, A. E.

Voltage supplies for the mass spectrograph. Jun 1946. 2p drawings Mi $1.25 Ph $1.25 (Limited supply mimeo $.05) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)

1. Atomic power—Research 2. Mass spectrographs 3. MDDC 1108

PB 94883

Schubert, Jack

Radiocolloidal properties of some fission products. Feb 1948. 9p diagr, graphs, tables Mi $1.25 Ph $1.25 (Limited supply mimeo $.05) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)

1. Atomic power—Research 2. Fission products—properties 3. Radiocolloids 4. AECD 1910

PB 93615

Siri, William.

Handbook of radioactivity and tracer methodology. Feb 1948. 867p tables, graphs, drawings Mimeo $20.00

1. Atomic power—Research 2. Radioactive substances—Production 3. Radioisotopes 4. Gamma rays 5. Radioactivity 6. Deuterons 7. Protons 8. Neutrons 9. Fission—Energy measurements 10. Betatrons 11. Synchrotrons 12. Cyclotrons 13. Isotopes

PB 95374

Tishkeff, G. H.

Polarographic analysis of uranium. Oct 1944. 4p diagr, drawing Mi $1.25 Ph $1.25 (Limited supply mimeo $.05) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)

1. Atomic power—Research 2. Uranium—Analysis 3. Polarographic analysis 4. AECD 2005

PB 95362

Way, K. and Haines, G.

Thermal neutron cross sections for elements and isotopes, H-Bi. Feb 1948. 20p tables Mi $1.75 Ph $2.50 (Limited supply mimeo $.10) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)

In Table I (Thermal Neutron Cross Sections for Elements) the compilers give their judgment of the "best values" of the absorption (A) and scattering (S) cross sections of the elements based on all the experimental data available at present. In Table II (Thermal Neutron Cross Sections for Isotopes) the values given are the "best experimental results for the absorption (A) and scattering (S) and total (T) cross sections based on measurements of each particular cross section. Masses, spins, abundances, and/or half lives are included. AECD 2138.

—62133

PB 95390

Winsberg, L.

Treatment of experimental data-radiations, lecture no 10. Jan 1947. 12p diagr, graph, tables Mi $1.75 Ph $2.50 (Limited supply mimeo $.10) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)

1. Atomic power—Research
2. Electrons—Radiation 3. AECD 2047

PB 94873

Wu, C. S. and Rainwater, L. J.

An investigation of the input grid current of the type 959 acorn tube used as an electrometer tube. Dec 1944. 8p drawing, graphs Mi $1.25 Ph $1.25 (Limited supply mimeo $.10) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.10)

Investigation of 14 tubes selected at random from a group of type 959 "acorn" pentodes showed input grid currents between 0.5×10^{-14} amperes when operated as electrometer tubes under special conditions. A Victoreen electrometer tube tested under similar conditions was found to have a grid current of 0.6×10^{-14} amperes. Both types of tubes showed flat grid current vs grid voltage curves over the entire operating region (input grid resistance $>10^{15}$ ohms). To obtain the full advantage of these tubes, extremely low humidity must be maintained at the tube and in the vicinity of the input circuit. When exposed to room humidity the grid currents were larger than those stated above regardless of the special "moisture-proof" treatments given to the insulation surfaces. In addition to increasing the total grid current the humidity also introduced a definite slope in the grid current vs grid voltage curves (input grid resistance $\leq 2 \times 10^{14}$ ohms). It was concluded that the special treatment of the surfaces thus far used cannot be entirely depended upon as a substitute for low humidity to prevent leakage currents. AECD 2049.

PB 95393

York, Herbert and others.

Acceleration of stripped light nuclei in the 60-inch cyclotron. May 1946. 3p Mi $1.25 Ph $1.25 (Limited supply mimeo $.05) (Also available from U. S. Atomic Energy Commission, Oak Ridge, Tenn. Mimeo: $.05)

Experiments have been done to produce accelerated stripped light nuclei with the 60-in. Berkeley cyclotron, for use in nuclear experiments. Two types of sources have been investigated: an arc source such as that normally used in cyclotrons, and a spark source similar to that used in spectroscopic investigations of highly ionized atoms. Typical yields from an arc source are $10^3 C^{13, +6}$ 146 Mev ions per second and $10^5 C^{12, +6}$ 135 Mev ions per second. Experiments with C^{+6} have previously been made at lower energies with the 37-in. cyclotron by

L. W. Alvarez, and with the 60-in. cyclotron by Tobias and Segre, and Condit, who also reported O^{+8}. Mddc 187.

PHYSIOLOGY

PB 95004

Békésy, Georg V.

On the elasticity of the cochlear partition. May 1948. 15p drawings, photos Mi $1.75 Ph $2.50

I. Hearing—Physiology 2. Ear, Internal

PB 95001

Hirsh, I. J.

Binaural summation and interaural inhibition as a function of the level of masking noise. Apr 1948. 9p diagr, graphs Mi $1.25 Ph $1.25

Offprinted from The American Journal of Psychology, Apr 1948, Vol LXI, pp 205-213

I. Ear—Physiology 2. Hearing—Tests 3. Noise, Masking

PB 95006

Hudgins, C. V. and others.

Comparative performance of an experimental hearing aid and two commercial instruments. May 1948. 18p photos, graphs Mi $1.75 Ph $2.50

I. Hearing aids

PB 95005

Miller, George A.

Perception of short bursts of noise. Mar 1948. 11p graphs Mi $1.75 Ph $2.50

I. Hearing—Tests 2. Noise—Measurements 3. Noise—Variations

PB 95002

Pollack, Irwin

Effects of high pass and low pass filtering on the intelligibility of speech in noise. May 1948. 8p graphs Mi $1.25 Ph $1.25

I. Noise, Background 2. Speech—Intelligibility—Tests

PB 95681

Rein, Friedrich Hermann and others.

Physiology, Part I—Vegetative physiology. (FIAT Review of German Science 1939-1946). 1948. 224p (Text in German) Mimeo: $3.00 Mi $8.00 Ph $28.75

I. Physiology, Vegetative—Germany

PB 95003

Wiener, Francis M.

Notes on sound diffraction by rigid circular cones. Jul 1948. 3p diagrs, graphs Mi $1.25 Ph $1.25

I. Hearing—Tests 2. Sound—Measurements

—62133

RUBBER AND RUBBER PRODUCTS

PB 95275

Gt. Brit. Ministry of Supply.

Tough natural rubber and polychloroprene compounds for sheathing electric cables and flexible cords. 1948. 2p table Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.05

I. Cables, Electric—Sheathing—Gt. Brit. 2. Compounds, Protective—Gt. Brit. 3. Electrical equipment—Tests 4. Polychloroprene compound 5. Rubber compound, Tough natural

PB 94127

Swett, Clyde C. and Dietrich, Joseph R.

Rubber conductors for aircraft ignition cables. Nov 1945. 52p drawings, graphs, tables Mi $2.75 Ph $7.50

The possibility of using conducting rubber as the conductor in aircraft ignition cable is considered in this report. Cables using such conductors are expected to eliminate internal corona and gas leakage in the cable, to reduce erosion of spark-plug electrodes, and possibly to reduce radio interference and to attenuate unwanted high-frequency, high-voltage surges. Rubber conductors were investigated and tested for use in aircraft ignition cables. The effects of stretch, temperature, and continuous and impulsive currents on the resistance of several conducting-rubber test strips of the same composition were determined. Two types of experimental conducting-rubber cable were tested. The conductivity requirements for application of conducting rubber to ignition cables have been estimated. The resistivity of conducting rubber of the composition tested is too high to permit its use in cables of more than about 2 feet in length. The resistivity was radically affected by the method of fabrication used and varied from approximately 10 ohm-centimeters for samples in sheet form to 1600 ohm-centimeters for cable samples. Typical variations of resistivity with stretch, temperature, and current are presented in the following table:

Conduction producing resistivity change[a]	Range of condition tested	Resistivity increase (percent)
Stretch followed by return to unstretched length.	0 to 67 precent....	270
Temperature.....	0° F to 140° F.....	42
Current (60 cycles, 30-min duration).	0 to 0.53 ampere/cm^2.	-54
Current (magneto output, 320-hr duration).	0 to magneto output for one spark plug.	-9
Impulsive voltage (1 impluse).	0 to 450 volts/cm..	0 ±5

[a]The changes are not permanent in all cases.

Tests on two experimental cables showed that a satisfactory method of fabricating conducting-rubber cables has not yet been developed. One cable had a dielectric strength approximately 25 percent above that of a similar standard cable but had a prohibitively high resistance, whereas the other cable had a much lower resistance but a poor dielectric strength. The development of ignition cable employing a rubber conductor depends on the development of a satisfactory method of fabrication. The existence of a wide field of application for such cables depends upon the development of conducting rubber having a resistivity of less than 1 ohm-centimeter. NACA E 96.

PB 81234r2

U. S. Air Force.

Rubber materials: Identification, inspection, testing, and storage of elastic shock absorber cord and elastic exerciser cord. Jul 1948. 2p tables Mi $1.25 Ph $1.25

STRUCTURAL ENGINEERING, INCLUDING BUILDING MATERIALS

PB 94761

Andersson, Yngve and Grahn, Bengt.

Beredning och användning av. A.I.V.-foder. 1948. 38p photos, drawings, tables (Text in Swedish) Mi $2.25 Ph $5.00

1. Ensilage—Sweden 2. Silos—Sweden 3. Jordbrukstekniska Institutet, Ultuna, Uppsala, Sweden. Meddelande. 205

PB 94762

Andersson, Yngve

Hur man bygger silor för A.I.V.-foder. 1946. 68p drawings, tables (Text in Swedish) Mi $3.00 Ph $8.75

1. Silos—Sweden 2. Jordbrukstekniska Institutet, Ultuna, Uppsala, Sweden. Meddelande. 204

PB 95500

Aston, G. H.

The sound insulation of partitions. 1948. 21p tables, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.20

1. Soundproofing—Gt. Britain 2. Insulation, Acoustic—Gt. Britain 3. Gt. Brit. Dept. of Scientific and Industrial Research

PB 94395

Batdorf, S. B. and Houbolt, John C.

Critical combinations of shear and transverse direct stress for an infinitely long flat plate with edges elastically restrained against rotation. Jan 1945. 27p drawings, graphs, tables Mi $2.00 Ph $3.75

An exact solution and a closely concurring approximate energy solution are given for the buckling of an infinitely long flat plate under combined shear and transverse direct stress with edges elastically restrained against rotation. It was found that an appreciable fraction of the critical stress in pure shear may be applied to the plate without any reduction in the transverse compressive stress necessary to produce buckling. An interaction formula in general use was shown to be decidedly conservative for the range in which it is supposed to apply. NACA L-183.

PB 94268

Chiarito, Patrick T. and Diskin, Simon H.

Strain measurements and strength tests on the tension side of a box beam with flat cover. Feb 1945. 33p photos, drawings, graphs Mi $2.25 Ph $5.00

Strains were measured to determine the shear and normal stresses caused by a load applied until failure of the tension side of an open box beam with a flat stiffened cover. The stresses measured at high loads were within 10 percent of the stresses calculated by an approximate theory and also by a method based on an exact theory for all stations except the root, at which the discrepancy was 17 percent. The maximum stress measured on the corner-flange angle was close to the tensile yield stress for the material. Failure occurred when the corner angle ruptured at a strain of 0.012. This strain was only about 10 percent of the maximum strain that was obtained from tests on solid tensile specimens of the same material. NACA L-59.

PB 94785

Eggwertz, Sigge

Theory of elasticity for thin circular cylindrical shells. 1947. 24p diagrs Mi $2.00 Ph $3.75

A summary is given of the development in Europe of modern circular cylindrical shells, especially the use of such shells in structural engineering and their design according to the mathematical theory of elasticity. Various more or less accurate procedures are described for solving the differential equations employed in the analytical method of calculation. The author discusses the systematization of the calculations and the use of tables. Brief mention is made of the Beam Method, which sometimes results in very simple calculations, easy of comprehension. Acta Polytechnica no. 13, 1947.

PB 94516

Erlandsen, Oscar and Mead, Lawrence M.

Method of shear-lag analysis of box beams for axial stresses, shear stresses, and shear center. Apr 1942. 58p drawings, graphs, tables Mi $2.75 Ph $7.50

A practical and relatively rapid method of compensating for shear lag in box-beam analysis, with accuracy sufficient for design purposes, is presented. Effectiveness curves for box-beam elements are derived for an ideal, symmetrical structure.

Application of the ideal curves to practical structures is described in detail using, as examples, the center section of the wing for an airplane designated as A and the unsymmetrical D-beam of the wing for an airplane designated as B. Tabular computation forms for rapid, accurate calculation of axial stresses, shear center, and shear stresses for a beam with shear lag are included. Results of analysis are compared with test stress distributions. Analytical methods of checking the shear-lag curves by the use of the principle of consistent deformations are illustrated as a further indication of their reliability. NACA W-33.

PB 95512

Gt. Brit. Ministry of Health.

The cost of house-building. (First report of the Committee of Inquiry appointed by the Minister of Health). 1948. 68p tables, graphs
Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.45
1. Buildings—Construction—Costs—Gt. Brit.
2. Housing—Gt. Brit.

PB 94392

Heimerl, George J. and Roy, J. Albert

Determination of desirable length of Z- and channel-section columns for local-instability tests. Oct 1944. 13p photos, drawings, graphs, tables
Mi $1.75 Ph $2.50
Local-instability tests of 24S-T aluminum-alloy formed Z- and channel-section columns were made in order to determine a length of test specimen that would avoid the increased strength associated with short lengths and also permit the occurrence of a convenient buckling pattern. The effect of column length on the critical compressive stress, on the average stress at Maximum load, and on the number of half-waves of the buckling pattern is shown. A buckling pattern of three half-waves is indicated as desirable for test purposes. A curve is presented from which may be determined the lengths of Z- or channel-section columns that give a buckling pattern of three half-waves. When the strength for local instability is very high, a reduction in the length indicated by the curve may be necessary to prevent column failure. In order to avoid the increased strength associated with short lengths, a ratio of length to web width above 3.5 should be used. NACA L-180.

PB 94775

Holmberg, A.

Tests with circular plates, 1947. 112p photos, diagrs, graphs, tables Mi $4.75
Ph $15.00

A new method for empirical determination of the moment distribution in plates and similar structural elements is described. The method's main principles are simulaneous measuring of angular displacements in all points necessary for observing the state of deformation, and graphical deriving of functions measured. The apparatus required and how it is employed are described. The accuracy of the method has been checked by a special test and found to be satisfactory for most purposes. Finally the method was applied to a test series of circular plates with different conditions of load and with large deflections. The results are given in nomograms. Acta Polytechnica No. 3, 1947.

PB 94741

Johannesson, Paul

Redogörelse för några utförda provningar av brand-dorrar. (Account of some tests of fire-doors). 1944. 17p photos, drawings, graph, table (Text in Swedish) Mi $1.75 Ph $2.50

Summary in English

Sweden. Statens Provningsanstalt, Stockholm. Meddelande 94

A number of fire-doors of different types of construction have been tested at the Fire Laboratory of the Government Testing Institute (Statens Provningsanstalt) on behalf of private parties. The results of these tests have been prepared and compared, in doing which the aim has been to arrive at a basis for experiments intended to provide suitable types of doors. The tests have comprised 3 different types of swinging doors, steel doors with loose or compact insulation, tin-clad wood-core doors (sheet-metal facings) and concrete doors. In two instances 2 doors, one on each side of the wall, about 25 cms apart, have been tested. The steel doors consisted of 2 steel plates, 1.25 to 1.5 mms thick, with an intervening space of ca 4 cms and stiffening irons. The insulation in the doors consists either of a loose substance, e.g., infusorial earth, of slabs or of a compact, cast substance with gypsum as the binding agent. The tin-clad wood-core doors were made of a wooden frame lined with 3 mms asbestos cardboard and 0.7—1 mm sheet-metal. The concrete doors were made in reinforced »granite concrete» or »clinker concrete» (»Clinder concrete»—concrete with stone of a highly porous clay material which has been fused by hard-burning). The door was exposed to heat on one side, the temperature being raised as closely as possible in accordance with the normal fire temperature curve. The door is placed so as to swing outwards or inwards as may be considered most difficult. The deformation and temperature on the air-side of the door are observed. The doors have been classified on the same basis as walls, which are divided up into the following fire-technical classes:

Brandsäker (Fire resistive)	class	A-8.
»	»	A-4.
»	»	A-2.
Brandhärdig (Fire retardant)	»	B-1.
Flamskyddad (Flame retardant).....	»	C-1/2.

During the fire period which corresponds to its fire-technical class, a door shall resist the effect of the fire: 1. without emitting smoke or combustible gases, 2. without the temperature on the air-side exceeding ca 150° C. The rule for resistance of the emission of smoke and combustible gases is considered as being fulfilled if the door does not bend entirely beyond the lintel and does not emit gases through the actual door. The temperature on the air-side has been determined as the average measurement at 3 points at different heights. At occasional points, e.g. at the lock and opposite a stiffening iron where the capacity of insulation must unavoidably be less than at other parts of the doors, a somewhat higher temperature than 150° C has been allowed. Test results: A. Steel doors. The most suitable steel construction had a door with vertical stiffening irons according to Fig. 16. No noticeable difference between the tested sheet-metal thicknesses of 1.25 and 1.5 mms could be found. By far the best insulation was a compact filling of infusorial earch and gypsum. A door with a gypsum filling must be carefully dried, however, and the sheet-metal protected by a suitable anticorrosive agent in order to prevent corrosion. Insulation with inlaid slabs is not suitable unless the joints between the slabs and the stiffening irons are carefully tightened. Insulation with loose substances often becomes displaced when the sheet-metal of the door becomes bent with the heat so that parts of the door are no longer insulated. If the substance is badly packed it becomes displaced already from shaking of the door in normal usage. The tests show that no tested insulating materials other than a cast pulp of gypsum and infusorial earth have an insulating capacity sufficient to meet the requirements for the ≫Brandhärdig≫ (Fire retardant) class in the case of the customary door-thickness of 4 cms. By an arrangement with 2 doors the resistance capacity to fire is considerably increased. A combination of 2 steel doors each of which is classified as ≫flammskyddande≫ (Flame retardant), with an intervening air space of 25 cms., thus ensures the closing of an opening classified as ≫ Brandsäker (Fire resistive Class A 4≫. B. Tin-clad wood-core doors. The tin-clad doors possessed good insulating capacity during the first hour and showed practically no deformation. When the wooden frame became heated, however, smoke and combustible gases were developed already after some minutes, escaped on the aid-side and became ignited after about 15 mins. Such a door is therefore not suitable as a firedoor. In the case of two wood-doors the drawbacks of the development of combustible gases from the wooden frame became still more apparent. An explosive mixture of gases easily arises between the doors and when it ignites tongues of flame are emitted on the air-side. The construction is thus unsuitable. C. Concrete doors. The doors of ≫clinker concrete≫ showed relatively small deformations and damage during the fire-test. The insulation capacity was not sufficient, however, to classify the doors as ≫Brandhärdiga≫ (Fire retardant. The door of ≫granite concrete≫ proved unsuitable as the concrete was blasted to pieces when it became heated. Doors of concrete are always relatively heavy and therefore cumbersome. They close with great force and may then easily be broken.

PB 94401

Kotanchik, Joseph N. and others.

Investigation of methods of supporting single-thickness specimens in a fixture for determination of compressive stress-strain curves. May 1945. 19p photos, drawings, graphs, tables Mi $1.75 Ph $2.50

An investigation was made of the methods of supporting single-thickness specimens of aluminum-alloy sheet material in a fixture for determination of compressive stress-strain curves. The specimens were supported in the fixture by rollers, offset-grooved plates, opposite-grooved plates, flat brass plates, or flat wooden plates. It was found that the measured values of compressive yield stress and modulus of elasticity obtained with the roller supports were independent of the supporting force applied to the specimen provided that a sufficient minimum force is used to overcome initial deviations from flatness. The stress-strain curves obtained by the use of the plate types of support were affected by an increase in the supporting force. Satisfactory stress-strain curves were obtained with all types of support, however, when the supporting force was approximately 45 pounds. The investigation also showed that the compression fixture, the specimen support, and the single-thickness specimens must be accurately made in order to obtain accurate stress-strain curves consistently. NACA L-189.

PB 94434

Libove, Charles and Stein, Manuel

Charts for critical combinations of longitudinal and transverse direct stress for flat rectangular plates. Mar 1946 27p graphs, tables Mi $2.00 Ph $3.75

Charts giving critical combinations of longitudinal and transverse direct stress are presented for isotropic flat rectangular plates with the following edge conditions. (a) all edges simply supported; (b) long edges simply supported, short edges clamped; (c) long edges clamped, short edges simply supported; and (d) all edges clamped. The charts are based upon energy solutions the accuracy of which is checked by comparisons with some particular exact results and lower limit solutions. An example illustrating the use of the charts is given. NACA L-224.

PB 94456

Lundquist, Eugene E. and Kotanchik, Joseph N.

The effect of initial displacement of the center support of the buckling of a column continuous over

three supports. Nov 1940. 15p photos, drawing, graphs, tables Mi $1.75 Ph $2.50
A long column continuous over three supports was tested to determine its critical load when the center support was given varying amounts of initial displacement. During each test the middle support was hinged so as to be free to move parallel to the column axis during buckling. The critical loads predicted from load-deflection readings were different for the upper and lower spans. The larger predicted critical load in each test was for the span that, on buckling, deflected so as to deepen the initial deflection curve of the span and the smaller predicted critical load in each test was for the span that, on buckling, deflected so as to straighten out and reverse the initial deflection curve of the span. These observations held regardless of whether the initial deflection of the center support was to the right or the left. The difference between the critical loads predicted for the upper and lower spans is proportional to the initial deflection of the center support. The difference noted in these tests is not large in terms of errors permissible in practical design. The fact that a difference exists in the predicted critical loads suggests that an indiscriminate single application of the Southwell method as presented in reference 2, or as modified in reference 1, can result in definite and measurable errors. The average of the predicted critical loads for the upper and lower spans is more correct than either predicted critical load. This observation suggests that whatever is causing the predicted critical load to be high in one span also causes the predicted critical load to be low in the other span. The average of the predicted critical loads for the upper and lower spans is reduced by initial displacement of the center support and this reduction tends to increase with the absolute value of the initial displacement. In these tests the reduction in the average critical load caused by initial displacement of the center support is very small. This fact indicates that the effect of curvature due to bending on the critical load for the compression flange material of a box beam is probably small and can be neglected in engineering design. NACA L-256.

PB 94534

McPherson, Albert E. and others.
Effect of developed width on strength of axially loaded curved sheet stringer panels. Nov 1944. 20p photos, drawings, graphs, tables Mi $1.75 Ph $2.50
Compression tests were made on six 24S-T aluminum alloy curved sheet-stringer panels 12 inches in length and 24 inches in width, reinforced by six Zee stringers spaced 4 inches between centers. The panels had two radii of curvature, 76.6 inches and 25.5 inches, and three sheet thicknesses, 0.025, 0.100, and 0.:89 inch. The panels were of the same design as six of the panels of reference 1 except for an increase in developed width from 16 inches to 24 inches. The increase in developed width had no significant effect on the strain for buckling of sheet between stringers, the strain for buckling of sheet between riverts, the load carried per sheet bay, or the stress at failure; however, it did reduce the critical strain for buckling of the panel as a whole between edge guides. NACA W-51.

PB 94786

Niordson, F. I. N.
Buckling of conical shells subjected to uniform external lateral pressure. 1947. 21p diagrs Mi $2.00 Ph $3.75
A formula is obtained from the theory of thin shells to determine the buckling pressure of frustums of conical shells, of the type used in submarines. It is shown that p c/E depends on two dimensionless numbers. The result can also be used for buckling beyond the proportional limit. Acta Polytechnica No. 14, 1947.

PB 94733

Nycander, Per
Über die messung von grossen kräften. (Om mätning av stora krafter). 1948. 14p photos, drawings, graphs, tables (Text in German)
Mi $1.75 Ph $2.50
Summary in Swedish
1. Stresses—Measurements—Sweden 2. Sweden. Statens Provningsanstalt, Stockholm. Meddelande 102

PB 94739

Nycander, Per
Värmeisolering och kondensering hos fönster. (Heat-transmission and condensation of double windows). 1946. 25p photo, drawings, graphs, tables (Text in Swedish) Mi $2.00 Ph $3.75
Summary in English
Sweden. Statens Provningsanstalt, Stockholm. Meddelande 96
Windows with inner- and outer glass panes in coupled sashes are often provided with a slit between the two sashes and between outer sash and frame while tightening is provided between frame and inner sash by means of a lining. The object of the slit is to ventilate the space between the two glass panes in order to prevent condensation in form of moisture or ice on the inside of the outer pane. With increased width of the slit the risk of condensation diminishes but the heat insulating value decreases. The present tests have been made to determine how the heat insulating value and condensation are dependent on the width of the slit and the distance between the panes. According to the test results conclusions are made as to suitable widths of slit and distances between the glass panes. The heat insulating value of the test windows is seen from Table 1. How the insulating value at a constant width of slit of 1 mm. depends on the distance between the panes is shown by Fig. 2. How the insulating value depends on the width of slit at a constant glass to glass distance of 40 mms. is shown

by Fig. 3. It is found that the insulating value does not change considerably when the width of slit and the distance between panes are varied within limits common in practice. The heat passage per unit area of the window seems to be almost independent of the size of the window. If a tightening lining is applied between the inner sash and the frame so that the warm inner air cannot get in between the glass panes there will as a rule be no condensation other than in connection with a sudden drop in the outside temperature. From the tests it appears that such condensation can be prevented by 1 mm. width of slit for distances between panes up to 40 mms. and by 2 mms. slit for distances up to 65 mms. At any rate the condensation seems to disappear rapidly when indicated widths of slit are provided. Thus it is found that a large distance between panes requires a large width of slit. By increasing the distance between the panes a slight increase in insulating value is gained if the slit is the same. If the slit, however, is increased according to the rules above there will be no advantage with large distance between the panes. Besides from drop of outside temperature condensation can occur if tightening of the window is made in such a way that the inside air can penetrate into the space between the glass panes. If incorrectly lining is placed between the outer sash and frame condensation can very easily occur on the inside surface of the outer glass pane. Even when correctly lining is placed between the inner sash and frame there can be condensation while the tightening seldom is complete. The possibility of condensation will then depend upon the difference in the air pressure on the outer and inner side of the window. If the outer air pressure is higher than the inner pressure no condensation will take place. If the pressure is almost the same on both sides condensation will not occur, provided the slit between outer sash and frame is larger than the slit between the inner sash and frame or a lining is applied on inner sash. If on the other hand the inside air pressure is higher than the outside air pressure and the tightening is incomplete, especially on the lower part of the window, there will easily be condensation. By a special design, however, which can be according to Fig. 9, condensation can be avoided.

PB 94742

Odqvist, Folke K. G. and Roos, J. O.
Enheten för kraft inom hållfasthets-tekniken. 1943. 4p (Text in Swedish) Mi $1.25 Ph $1.25
Summary in German
1. Stresses—Test—Sweden 2. Sweden. Statens Provningsanstalt, Stockholm. Meddelande 93

PB 94323

Peterson, James P.
Shear-lag tests of a box beam with a highly cambered cover in tension. Jul 1945. 13p drawings, graphs Mi $1.75 Ph $2.50

bending tests were made on a open box beam designed to fail on the highly cambered tension side. Strain measurements were made to verify the applicability of previously published method of shear-lag analysis to highly cambered sections. The average stringer stresses near the root were found to be in fair agreement with the stresses calculated by the shear-lag theory, although individual stress values showed appreciable scatter. In the strength test, the beam developed an ultimate tensile stress only a little higher than the tensile yield stress of the material. NACA L-106.

PB 94410

Schuette, Evan H. and Roy, J. Albert
Determination of effective column length from strain measurements. Jun 1944. 24p photo, drawings, graphs Mi $2.00 Ph $3.75
A method is presented for the experimental determination of the effective length of a column for which the end conditions are unknown by establishing the points of zero curvature from readings of strain gages distributed along the length of the column. Tests of four columns of different cross sections indicated that the proposed method gives satisfactory results even when there is considerable scatter in the strain-gage readings. NACA L-198.

PB 97738

U. S. Army Air Forces.
Kit: Machinist, test, structures, aircraft laboratory. Feb 1947. 4p tables Mi $1.25 Ph $1.25
1. Laboratories, Aeronautical
2. Laboratories, Structural and mechanical

TEXTILES AND TEXTILE PRODUCTS

PB 95555

Battles, H. G.
Neoprene coated nylon tip stop parachute fabric. Sep 1948. 2p table Mi $1.25 Ph $1.25
1. Coatings, Neoprene

PB 92917r

Gt. Brit. Ministry of Supply.
Aircraft material specification: Approval procedure for proprietary materials and processes. Jul 1948. 4p tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.35
Revision 1 of PB 92917

PB 95516

Gt. Brit. Ministry of Supply.
Aircraft material specification, nylon fabric body armour. Jul 1948. 2p Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.20

1. Armor, Aircraft—Gt. Brit. 2. Armor, Body—Gt. Brit. 3. Fabrics, Nylon—Gt. Brit.

PB 95514

Gt. Brit. Ministry of Supply.

Aircraft material specification, rayon fabric, scoured or scoured and dyed. Jul 1948. 2p Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.20

1. Materials, Aircraft—Gt. Brit.
2. Fabrics, Rayon—Gt. Brit.

PB 94732

Kärrholm, Marianne and others.

Provning av vattenavvisande förmga hos vävnader. (Determination of water repellent properties of fabrics in artificial rain). 1947. 27p photos, drawing, graphs, tables (Text in Swedish) Mi $2.00 Ph $3.75

Summary in English

Sweden. Statens Provningsanstalt, Stockholm. Meddelande 104

A short review of various methods of testing water repellency is given, and a new apparatus, built on the principle of an artificial rainfall, is described. Several investigations have been performed with this apparatus. The temperature of the raining water must be kept within 2° C, if the water absorbed in the cloth on testing shall not vary more than 5%. Increased temperature means increased water absorption. The amount of rain may be varied within 500 ± 20 ml per minute, if the variation in absorption shall be less than 5%. There is no difference in absorption, if a given amount of water falls slowly over a shorter or more rapidly over a longer time. The amount of water per sample should be at least 4 liters, in order to give proper flowing down the cloth. The hardness of water is of small importance. The pH is essential, especially with wool cloth. It may be varied between 6 and 8. The height of the fall of drops should be at least $1.^{5}$ m. A lower height gives too high a dispersion of the experimental results. We have investigated the amount of water absorbed as a function of the time of the rain fall for a few different types of cloth. The results of the test should be given as water absorbed in percent of the weight or the volume of the cloth.

—82133

PB 95273

Riedemann, A.

The behavior of the components of cellulose in the processing of pulp to viscose. Apr 1947. 9p tables Mi $1.25 Ph $1.25

1. Flocculation 2. Viscose process 3. Mercerization liquids 4. Cellulose—Analysis 5. Cellulose—Tests

PB 94232

Adler, Alfred A.

Variation with Mach number of static and total pressures through various screens. Feb 1946. 20p drawings, graphs Mi $1.75 Ph $2.50

Tests were conducted in the Langley 24-inch high-speed tunnel to ascertain the static-pressure and total-pressure losses through screens ranging in mesh from 3 to 12 wires per inch and in wire diameter from 0.023 to 0.041 inch. Data were obtained from a Mach number of approximately 0.20 up to the maximum (choking) Mach number obtainable for each screen. The results of this investigation indicate that the pressure losses increase with increasing Mach number until the choking Mach number, which can be computed, is reached. Since choking imposes a restriction on the mass rate of flow and maximum losses are incurred at this condition, great care must be taken in selecting the screen mesh and wire diameter for an installation so that the choking Mach number is not approached at the maximum operating velocity. NACA L-23.

PB 94375

Batterson, Sidney A.

NACA impact basin and water landing tests of a float model at various velocities and weights. Aug 1944. 19p photos, drawings, graphs Mi $1.75 Ph $2.50

The first data obtained in the United States under the controlled testing conditions necessary for establishing relationships among the numerous parameters involved when a float having both horizontal and vertical velocity contacts a water surface are presented. The data were obtained at the NACA impact basin. The report is confined to a presentation of the relationship between resultant velocity and impact normal acceleration for various float weights when all other parameters are constant. Analysis of the experimental results indicated that the maximum impact normal acceleration was proportional to the square of the resultant velocity, that increases in float weight resulted in decreases in the maximum impact normal acceleration, and that an increase in the flight-path angle caused increased impact normal acceleration. NACA L-163.

PB 94422

Batterson, Sidney A.

Variation of hydrodynamic impact loads with flight-path angle for a prismatic float at 3° trim and with a 22 1/2° angle of dead rise. Feb 1945. 8p photos, graphs Mi $1.25 Ph $1.25

Tests were made in the Langley impact basin to determine the relationship between impact normal acceleration and flight-path angle for seaplanes landing on smooth water. The tests were made at both high and low forward speeds with the model at 3° trim. The model had a dead-rise angle of 22 1/2° and, with the drop linkage, weighed 1100 pounds. The results of the tests indicated that the maximum impact normal acceleration was proportional to γ 1.36 over the test range of flight-path angle γ and that the effects of gravity forces appeared normal acceleration had occurred. NACA L-211.

PB 94278

Batterson, Sidney A. and Stewart, Thelma

Variation of hydrodynamic impact loads with flight-path angle for a prismatic float at 6° and 9° trim and a 22 1/2° angle of dead rise. Feb 1946. 10p drawings, graphs Mi $1.25 Ph $1.25

Tests were made in the Langley impact basin to determine the relationship between impact normal acceleration and flight-path angle for seaplanes landing in smooth water. The tests were made at both high and low forward speeds and at trims of 6° and 9°. The model had a 22 1/2° angle of dead rise and a gross weight of 1100 pounds. The results of the tests indicated that, over the test range of flight-path angle γ, the maximum impact normal acceleration was proportional to γ 1.54 for 6° trim and to γ 1.33 for 9° trim. At low flight-path angles the dynamic lift forces resulting from the downward deflection induced in the water impinging upon the float bottom predominated, whereas at high flight-path angles the forces resulting from the virtual mass predominated. The maximum depth of immersion and the immersion that occurred at the instant of maximum normal force showed very little effect of trim. NACA L-69.

PB 94277

Batterson, Sidney A.

Variation of hydrodynamic impact loads with flight-path angle for a prismatic float at 12° trim and with a 22 1/2° angle of dead rise. Feb 1946. Mi $1.25 Ph $1.25

Tests were made in the Langley impact basin to determine the relationship between impact normal acceleration and flight-path angle for seaplanes landing on smooth water. The tests were made at varying resultant velocities with the model at 12° trim. The model had a 22 1/2° angle of dead rise and a total weight of 1100 pounds. The results of the tests indicated that the maximum impact normal acceleration was proportional to γ 1.22 over the test range of flight-path angle γ and that maximum impact normal acceleration occurred prior to or at the instant of chine immersion. NACA L-68.

PB 94240

Becker, John V. and Korycinski, Peter F.

Aerodynamic tests of a full-scale TBF-1 aileron installation in the Langley 16-foot high-speed tunnel. Dec 1944. 36p photos, drawings, graphs, tables Mi $2.25 Ph $5.00

The failure of wing panels on a number of TBF-1 and TBM-1 airplanes in flight has prompted several investigations of the possible causes of failure. This report describes tests in the Langley 16-foot high-speed tunnel to determine whether these failures could be attributed to changes in the aerodynamic

characteristics of the ailerons at high speeds. The tests were made of a 12-foot-span section including the tip and aileron of the right wing of a TBF-1 airplane. Hinge moments, control-link stresses due to aerodynamic buffeting, and fabric-deflection photographs were obtained at true airspeeds ranging from 110 to 365 miles per hour. The aileron hinge-moment coefficients were found to vary only slightly with airspeed in spite of the large fabric deflections that developed as the speed was increased. An analysis of these results indicated that the resultant hinge moment of the ailerons as installed in the airplane would tend to restore the ailerons to their neutral position for all the high-speed flight conditions covered in the tests. Serious aerodynamic buffeting occurred at up aileron angles of -10° or greater because of stalling of the sharp projecting lip of the Frise aileron. The peak stresses set up in the aileron control linkages in the buffeting condition were as high as three times the mean stress. During the hinge-moment investigation, flutter of the test installation occurred at airspeeds of about 150 miles per hour. This flutter condition was investigated in some detail and slow-motion pictures were made of the motion of the wing tip and aileron. The flutter was found to involve simultaneous normal bending and chordwise oscillation of the wing and flapping of the aileron. The aileron motion appeared to be coupled with the motion of the wing through the mass unbalance of the aileron in the normal-to-chord plane due to location of the hinge line 2.17 inches below the center of gavity of the aileron. Flutter did not occur when the installation was stiffened to prevent chordwise motion or when the bending frequency of the aileron system was appreciably higher than that of the wing as in the complete airplane installation. NACA L-31.

PB 94472

Becker, John V.

Wind tunnel tests of air inlet and outlet openings on a streamline body. Nov 1940. 50p photos, drawings, graphs, tables MI $2.50 Ph $6.25

In connection with the general problem of cowling and cooling an aircraft power plant located within a fuselage, tests were made in the NACA 8-foot high-speed wind tunnel to determine the effect on external drag and on the pressure distribution of air inlet openings located at the stagnation point of a streamline body. Air outlet openings located at the tail and at the 21-percent and 63-percent stations of the body were also investigated. Boundary-layer transition measurements were made and correlated with the force and the pressure data. Individual openings were tested with the aid of a blower and then practicable combinations of inlet and outlet openings were tested. Various modifications to the internal duct shape near the inlet opening and the aerodynamic effects of a gun in the duct were also studied. The results showed that the external drag (measured drag less computed drag due to internal duct losses) of the body with suitably designed nose-inlet and tail-outlet openings over a wide range of rates of internal air flow was no higher than the drag of the streamline body. The static-pressure distribution with the best of such combinations was almost identical with that of the corresponding portion of the streamline body. As a consequence, the same favorable boundary-layer flow conditions as on the streamline body were obtained. The local velocity increments at the noses were so low that the critical speed of a fuselage employing these shapes would depend on the peak-velocity increments occurring elsewhere than on the nose. The results of the tests suggested that outlet openings should be designed so that the static pressure of the internal flow at the outlet would be the same as the static pressure of the external flow in the vicinity of the opening. Radical changes in the internal-duct arrangement near the inlet openings had little effect on the external drag or pressure distribution. NACA L-300.

PB 94317

Beeler, De E.

Maximum rates of control motion obtained ground tests. May 1944. 14p photos, graphs, table MI $1.75 Ph $2.50

Ground tests were conducted in a specially constructed cockpit rig to determine the maximum rates of rates of control-stick (elevator) motion and the corresponding maximum stick forces that could be exerted, as based on results obtained with a number of pilots. The measurements indicate that the maximum rate of push on the control stick is greater than the maximum rate of pull; that the maximum rate of either push or pull is less when a mental restriction is imposed upon the pilot; and that the maximum rates at which the pilot thought he would apply elevator control forces in flight are considerably less than the rates at which he could apply these forces with the same stick stiffness. NACA L-100.

PB 94439

Benson, James M. and Lina, Lindsay J.

The use of a retractable planing flap instead of a fixed step on a seaplane. May 1943. 27p drawings, graphs, tables MI $2.00 Ph $3.75

Data are presented and discussed to show the improvements in both the hydrodynamic and the aerodynamic performance of a seaplane that could be obtained if a retractable planing flap were used instead of the conventional main step. The improvements in resistance made possible by use of a planing flap to vary the depth of step during and after take-off are of the order of 8 percent in the water resistance at the hump speed and about 2 or 3 percent in the total air drag of a long-range flying boat of current design at cruising attitude. One type of retractable flap that could be used is described and the results of hydrodynamic stability tests of a model fitted with the flap are given. The tests indicated that very good stability characteristics could be provided with the planing flap for take-off and landing. NACA L-237.

PB 94288

Bidwell, Jerold M. and Goldenbaum, David M.

Resistance tests of models of three flying-boat hulls with a length-beam ratio of 10.5. Sep 1945. 42p photos, drawings, graphs Mi $2.50 Ph $6.25

Models of three flying-boat hulls, each with a length-beam ratio of 10.5, were tested at the Langley tank no. 1. The lines of these models were derived from the Deutsche Versuchsanstalt für Luftfahrt (DVL) standard series. The three models permitted tests with two depths of step and two angles of dead rise. Resistance, trimming-moment, and wetted-length data were obtained from general fixed-trim and free-to-trim tests at load coefficients ranging up to 4.0. The results showed that these three models had low hydrodynamic resistance at high load coefficients. At the free-to-trim hump, load-resistance ratios of 4.5 and 3.9 were attained at load coefficients of 1.5 and 3.5, respectively, increasing the angle of dead rise, excluding chine flare, from 20° to 24.5° tended to increase the resistance and trimming moments at planing speeds. Changing the depth of step from 5 to 10 percent beam had little effect on the resistance. With conventional nacelle locations, excessive spray would enter the propellers at load coefficients over 3.0. NACA L-79.

PB 94292

Biebel, William J.

Low-pressure boundary-layer control in diffusers and bends. Apr 1945. 41p drawings, graphs, tables Mi $2.50 Ph $6.25

Tests have been made to study the effectiveness of small pressure differences, such as exist between the inside of airplane ducts and the external airplane surfaces suitable for duct exists, in removing the duct boundary layer through slots in the duct wall and thereby reducing separation losses. Two-dimensional diffusers of 15° and 30° included angles and some 90° bends were tested. The 30° diffuser was tested with and without a resistance at the large end. Several different types of boundary layer were set up at the diffuser inlets. All the diffuser tests indicated that the expansion losses could be reduced at least half by the removal of approximately 4 to 10 percent of the total air flow; and the pressure required to blow out the boundary layer was small relative to the pressures normally available in airplane ducts. The slots in the diffuser arrangements were generally formed merely by cutting narrow strips from the two diverging walls of the diffuser. Not more than one slot was used on each surface, and none were usually required on the two parallel walls of the diffuser. Effective boundary-layer control for the inner corners of the bends required a slot with a lip that projected into the duct in order to help "peel off" the boundary layer and also required somewhat higher internal pressures than were used with the diffusers. NACA L-84.

—62133

PB 94287

Bielat, Ralph P.

Simple method for estimating terminal velocity including effect of compressibility on drag. Aug 1945. 26p drawings, graphs, tables Mi $2.00 Ph $3.75

A generalized drag curve that provides an estimate for the drag due to compressibility has been obtained from an analysis of wind-tunnel data of several airfoils, fuselages, nacelles, and windshields at speeds up to and above the wing critical speed. The airfoils analyzed had little or no sweepback and effective aspect ratios above 6.5. A chart based on the generalized drag curve is presented from which the terminal velocity of a conventional airplane that employs a wing of moderate aspect ratio and very little sweepback in a vertical dive may be rapidly estimated. In order to use the chart, the only data that need be known about the airplane are a low-speed drag coefficient, the wing critical speed, and the wing loading. The terminal velocities for three airplanes were computed in order to illustrate the use of the method and chart. Good agreement between the estimated terminal velocity and the measured flight terminal velocity was indicated for all three airplanes. NACA L-78.

PB 94384

Bird, J. D.

Effect of leakage past aileron nose on aerodynamic characteristics of plain and internally balanced ailerons on NACA 66(215)-216, a = 1.0 airfoil. Jul 1945. 43p drawings, graphs, tables Mi $2.50 Ph $6.25

An investigation has been made in two-dimensional flow to determine the effect of leakage past the aileron nose on the aerodynamic characteristics of ailerons. Plain and internally balanced ailerons of 0.20 airfoil chord were tested on an NACA 66(215)-216, a = 1.0 airfoil. The effects of amount and type of leakage, aileron contour, and Mach number and Reynolds number were investigated. The results of the tests indicated that a small amount of leakage area changed the pressure distributions over the plain and internally balanced ailerons markedly. This change generally resulted in negative increments in the lift and hinge-moment parameters c_{l_σ}, c_{h_α}, and c_{h_σ}. A further increase in the leakage area produced smaller changes in these parameters for the internally balanced aileron. NACA L-172.

PB 94322

Bird, J. D.

Wind-tunnel tests of a blunt-nose aileron with beveled trailing edge on an NACA 66(215)-216 airfoil with several modifications of aileron nose and adjacent airfoil contour. Feb 1945. 36p drawings, graphs, tables Mi $2.25 Ph $5.00

Ailerons having a beveled trailing edge and a blunt-nose overhang of 35 percent aileron chord on an NACA 66(215)-216 airfoil have been tested in the two-dimensional-flow test section of the Langley

stability tunnel. Five configurations of the model were tested with various modifications of the aileron nose and adjacent airfoil contour to determine the effect of these modifications on the lift and aileron hinge-moment characteristics. The results indicated that making the nose of the aileron more elliptical decreased the balance of hinge moments at small aileron angles and increased the balance of hinge moments at large aileron angles. The lift coefficients, especially at large aileron angles, were increased by this modification. Flaring the airfoil contour near the aileron nose had an effect on the hinge moments for small aileron angles similar to the effect of making the aileron nose less blunt, whereas rounding the airfoil contour had an effect similar to making the aileron nose more blunt. Flaring and airfoil contour caused a decrease in the lift resulting from aileron deflection. The effects of airfoil-contour changes were small at large aileron angles. Comparison with other data indicated that, for small aileron angles, the increments of hinge-moment coefficient resulting from a beveled trailing edge and a blunt-nose overhang were additive. NACA L- 105.

PB 94484

Bird, J. D. and Mendelsohn, Robert A.

Wind-tunnel tests of a piston-type control booster on an airfoil and aileron model. Nov 1943. 16p photo, drawings, graphs Mi $1.75 Ph $2.50
Measurements of control moments were made in the NACA stability tunnel to determine the operational characteristics of a piston-type control booster on an aileron. The tests were made on a 6-foot-span and 4-foot-chord airfoil which extended completely across the 6-foot-square test section. The chord of the aileron was 31 percent of the airfoil chord and the aileron span was one-half that of the airfoil. The booster was so constructed and installed that pressures picked up from the air stream below the wing acted on a pair of pistons. The resulting force was transmitted from the pistons to the aileron by a system of linkages and gears in such a way that the moment produced by the booster increased almost linearly with aileron deflection in opposition to the hinge moment of the aileron. The data are presented in the form of curves of pressure coefficients acting on the pistons, hinge-moment coefficients, and booster coefficients plotted against aileron deflection. The results of the investigation indicate that fairly good balance of aileron hinge moments should be obtained by the use of this type of booster. NACA L-494.

PB 94391

Braslow, Albert L.

Wind-tunnel investigation of aileron effectiveness of 0.20-airfoil-chord plain ailerons of true airfoil contour on NACA 65_2-415, 65_3-418 and 65_4-421 airfoil section. Aug 1944. 17p drawings, graphs, tables Mi $1.75 Ph $2.50
An investigation was made in the NACA two-dimensional low-turbulence pressure tunnel to determine the aileron effectiveness of 0.20-airfoil-chord plain ailerons of true airfoil contour on the NACA 65_2-415, 65_3-418, and 65_4-421 airfoil sections. The aileron effectiveness parameter (change in section angle of attack with aileron deflection at constant lift coefficient) decreased very slightly with an increase in airfoil thickness from 15 percent to 21 percent. At higher deflections of the ailerons and higher section angles of attack, the increment of section lift coefficient due to aileron deflection was more appreciably reduced with an increase of airfoil thickness than was the aileron effectiveness parameter. The slope of the airfoil section lift curve c_{l_α} was substantially the same for the three airfoils tested. NACA L-178.

PB 94503

Boelter, L. M. K. and others.

Investigation of aircraft heaters. IX. Measured and predicted performance of two exhaust gas-air heat exchangers and an apparatus for evaluating exhaust gas-air heat exchangers. Mar 1943. 38p photos, drawings, graphs, tables Mi $2.25 Ph $5.00
Laboratory tests have been conducted to determine the thermal output and the pressure drop characteristics of the Airesearch and Lolar fluted-type exhaust gas-air heat exchangers. The apparatus employed in these tests consists of a natural gas furnace of 3,000,000 Btu per hour thermal capacity, a centrifugal blower for delivering combustion air to the furnace and ventilating air to the heat exchanger under test together with a system of ducting and various measuring devices. With this test stand, exhaust gas and ventilating air can be circulated through the heat exchanger under test at flow rates of 8500 and 6500 pounds per hour, respectively, at an exhaust gas temperature of 1600° F. It was found that at exhaust gas and ventilating air flow rates of 7000 and 5000 pounds per hour, respectively, the thermal output of the Airesearch heat exchanger was about 320,000 Btu per hour while that of the Solar unit was about 170,000 Btu per hour. This difference in output is accounted for largely in the much greater area of heat transfer surfaces in the Airesearch heat exchanger. In the analysis of the test data the measured thermal outputs and pressure drops of the two heat exchangers are compared with predicted values. NACA W-20.

PB 94498

Boelter, L. M. K. and others.

Investigation of aircraft heaters. X. Measured and predicted performance of a fluted-type exhaust gas and air heat exchanger. Mar 1943. 36p photos, drawings, graphs, tables Mi $2.25 Ph $5.00
Performance data on a small Airesearch exhaust gas and air heat exchanger are presented. Heat transfer rates were measured, using about 8000 pounds per hour of exhaust gas and about 4300 pounds per hour of ventilating air. The inlet exhaust gas temperature was maintained at approximately 1400° F; whereas

the ventilating air temperature was about 95° F. Tests were made with the air shroud disposed in two different positions. Pressure drop measurements were made on both the exhaust gas side and the ventilating air side of the heat exchanger. The maximum measured rate of heat transfer was 259,000 Btu per hour; whereas the maximum static pressure drops were 7.3 inches of water and 12.4 inches of water on the exhaust gas and ventilating air sides of the heater, respectively. The measured thermal outputs and pressure drops are compared with predicted values and also with measured values obtained on a similar but larger Airesearch fluted-type heater. Equations for the unit thermal conductance reported earlier are rewritten in terms of the L/D ratio of finned or unfinned heat exchangers. NACA W-16.

PB 94497

Boelter, L. M. K. and others.

Investigation of aircraft heaters. XI. Measured and predicted performance of a slotted-fin exhaust gas and air heat exchanger. Apr 1943. 49p Mi $2.50 Ph $6.25

Thermal and pressure drop performance data of a slotted-fin Stewart-Warner exhaust gas and ventilating air heat exchanger are presented. Measurements were made, using up to 7000 pounds per hour of exhaust gas and up to 5000 pound per hour of ventilating air. The inlet exhaust gas temperature was maintained at about 1400° F; whereas that of the ventilating air was about 95° F. Three different crossflow air shrouds were used in these tests. The effect of installing a "central core" in the exhaust gas side of the heater was determined. Isothermal and non-isothermal static pressure drop measurements were made on both the exhaust gas and ventilating air sides of the heater. Isothermal pressure drops across the inlet and outlet ducts of the air shrouds were measured. Temperatures of the heater surfaces at several points were also recorded. Measured and predicted heat transfer rates and pressure drops are compared. The maximum measured rate of heat transfer was 216,000 Btu per hour. The maximum measured non-isothermal pressure drop on the ventilating air side, using a semi- or diagonal-crossflow air shroud was 16.5 inches of water; whereas that using a full crossflow shroud was 5.3 inches of water. The maximum measured pressure drop on the exhaust gas side of the heater was 9.8 inches of water before the central core was installed and 16.9 inches of water after the central core was in place. The maximum heater-surface temperature was 1120° F. NACA W-15.

PB 94499

Boelter, L. M. K. and others.

Investigation of aircraft heaters. XII. Performance of a formed-plate crossflow exhaust gas and air heat exchanger. May 1943. 24p photos, drawings, graphs, tables Mi $2.00 PH $3.75

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Performance data on a Trane exhaust gas and air heat exchanger are presented. Heat transfer rates were measured using exhaust gas rates ranging from 4550 lb/hr to 7000 lb/hr and ventilating-air rates from 2200 lb/hr to 4750 lb/hr. The inlet exhaust gas temperature was maintained at approximately 1400° F; whereas the inlet temperature of the ventilating air was about 95° F. Pressure drop measurements were made across the exhaust-gas side and across the ventilating air side of the heat exchanger under isothermal and non-isothermal conditions. In addition, isothermal pressure drops across the inlet and outlet air ducts alone were measured. The maximum measured rate of heat transfer was 369,000 But/hr with maximum static pressure drops of 18.8 inches of water and 13.9 inches of water on the exhaust gas and ventilating air sides of the heat exchanger, respectively The measured thermal outputs and the static pressure drops are compared with predicted magnitudes. NACA W-17.

PB 94500

Boelter, L. M. K. and others.

Investigation of aircraft heaters. XIII. Performance of corrugated and noncorrugated fluted type exhaust gas-air heat exchangers. Aug 1943. 39p photos, drawings, graphs, tables Mi $2.25 Ph $5.00

Thermal and static pressure-drop performance data on three fluted-type heat exchangers are presented. Two of the heaters utilized corrugated surfaces along the fluid passages and the third one was constructed with non-corrugated surfaces. In these tests all heaters were fitted with the same air shroud. Previously reported data taken on the latter heater, but with a different air shroud, are compared with the current data. Exhaust-gas rates from 3500 pounds per hour to 6600 pounds per hour and ventilating-air rates from 1500 pounds per hour to 4700 pounds per hour were used. Pressure-drops measurements were made across the exhaust-gas and ventilating-air sides of the exchanger under both isothermal and nonisothermal conditions. The measured thermal outputs and static pressure drops are compared with predicted magnitudes. NACA W-18.

PB 94504

Boelter, L. M. K. and others.

Investigation of aircraft heaters. XIV. An air and heat flow analysis of a ram-operated heater and duct system. Mar 1944. 35p drawings, graphs; tables Mi $2.25 Ph $5.00

A method of graphical analysis is outlined which allows the prediction of the thermal and aerodynamic performance of a ram-operated heater and duct system, for cabin heating or wing de-icing, at any altitude and airplane speed. This performance may be predicted from the isothermal total pressure drop across the components of the duct system at several ventilating air rates, and the thermal output of the heater at various air and exhaust gas rates. NACA W-21.

PB 94502

Boelter, L. M. K. and others.

Investigation of aircraft heaters. XV. Emissivity of several materials. Jan 1944. 16p drawings, graphs Mi $1.75 Ph $2.50

The mean effective emmissivity as a function of temperature for the surfaces of several metals and insulating materials has been determined. The surfaces are typical samples of the materials which are used in aircraft construction. A description and discussion of the mensuration technique is presented. The data are evaluated over a range of surface temperatures from approximately 110° F to approximately 350° F. Over the range of temperatures investigated, it was found that the mean effective emmissivities of the surfaces tested were approximately constant with temperature when viewed normal to the surface; the several emissivities ranged from approximately 0.05 to approximately 0.85. The color of a surface is not a criterion for estimating the emissivity at the wavelengths and temperatures under consideration; texture and chemical composition of the surface are probably more reliable criterions. The result obtained has been termed the "mean effective emissivity," since it is a factor to be used in a particular equation involving temperatures determined by means of thermocouples mounted in a particular manner. This definition must be kept in mind in using the values of the emissivities given. NACA W-19.

PB 94505

Boelter, L. M. K. and Sharp, W. H.

Investigation of aircraft heaters. XVI. Determination of the viscosity of exhaust gases from a gasoline engine. Jun 1944. 28p photo, drawing, graphs, tables Mi $2.00 Ph $3.75

The absolute viscosity of exhaust gases from a gasoline engine was measured at temperatures from 75° to 890° F and at compositions corresponding to fuel-air ratios ranging from 0.0625 to 0.167. The viscosity was found to be nearly independent of the fuel-air ratio and within 6 percent of the value for dry air at the same temperature. During the calibration tests measurements of the viscosities of air, N_2, O_2, and CO_2 were also obtained. NACA W-22.

PB 94508

Boelter, L. M. K. and others.

Investigation of aircraft heaters. XIX. Performance of two finned-type crossflow exhaust gas and air heat exchangers. Aug 1944. 53p Mi $2.75 Ph $7.50

Data on the thermal performance and the static pressure drop characteristics of two finned-type exhaust gas and air heat exchangers are presented. One heater was constructed of copper and stainless steel, the other was constructed entirely of an aluminum alloy. Two different shrouds were used in the tests on each exchanger. The exhaust-gas weight rates used in the tests varied from 1800 lb/hr to 5700 lb/hr, and the ventilating-air weight rates ranged from 1000 lb/hr to 4500 lb/hr. Static pressure drop measurements were made across the exhaust-gas and ventilating-air sides of the heater under isothermal and non-isothermal conditions. The measured thermal outputs and static pressure drops are compared with predicted magnitudes. NACA W-25.

PB 94511

Boelter, L. M. K. and others.

Investigation of aircraft heaters. XX. Measured and predicted performance of a finned-type cast-aluminum crossflow exhaust gas and air heat exchanger. Apr 1945. 28p photos, drawings, graphs, tables Mi $2.00 Ph $3.75

Data on the thermal performance and the static pressure drop of a finned-type cast-aluminum exhaust gas and air heat exchanger are presented. One shroud, hereinafter designated as the UC-1 or full-crossflow shroud, was used for the tests on the heater. The exhaust gas rates used in the tests ranged from 1740 to 5150 pounds per hour, and the ventilating air rates were varied from 1000 to 4500 pounds per hour. Static pressure drop measurements were made across the exhaust gas and ventilating air sides of the heater under isothermal and non-isothermal conditions. The measured thermal outputs and static pressure drops are compared with predicted magnitudes. NACA W-28.

PB 94510

Boelter, L. M. K. and others.

Investigation of aircraft heaters. XXI. Measured and predicted performance of a flattened-tube type crossflow exhaust gas and air heat exchanger. Apr 1945. 32p Mi $2.25 Ph $5.00

Data on the thermal performance and the static pressure drop characteristics of a "flattened-tube type" crossflow exhaust gas and air heat exchanger are presented. A full-crossflow type air shroud was used for the tests on this exchanger. The weight rates of exhaust gas which were used in the tests varied from 1700 lb/hr to 4200 lb/hr and the weight rates of ventilating air ranged from 1000 lb/hr to 4200 lb/hr. The inlet temperature of the exhaust gas was kept at approximately 1600° F. Static pressure drop measurements were made across the exhaust gas and ventilating air sides of the heater under isothermal and non-isothermal conditions. The measured thermal outputs and static pressure drops are compared with predicted magnitudes. NACA W-27.

PB 94512

Boelter, L. M. K. and others.

Investigation of aircraft heaters. XXIII. Measured and predicted performance of a flat-plate type exhaust gas and air heat exchanger. Apr 1945. 27p drawings, graphs, tables Mi $2.00 Ph $3.75

Results of tests of the thermal performance and the static pressure drop characteristics of a flat-plate type exhaust gas and air heat exchanger are presented. The ventilating air shroud built into this heat exchanger gives characteristics of cross flow

and parallel flow. The range of the exhaust gas weight rates used in tests for the determination of the heat transfer rates was from about 1700 lb/hr to about 5200 lb/hr. The temperature of the exhaust gas was maintained at approximately 1600° F. Static pressure drop measurements were made across both sides of the heat exchanger under isothermal and non-isothermal conditions. Heater surface temperatures at the entrance and exit of the heat exchanger were recorded. Predictions of the thermal outputs and pressure drops are compared with the experimentally determined values. NACA W-29.

PB 94513

Boelter, L. M. K. and others.

Investigation of aircraft heaters. XXIV. Heat meter in the transient state for unidirectional heat transfer. Sep 1944. 47p graphs, drawings, tables Mi $2.50 Ph $6.25

This report describes the behavior of the heat meter when it is used in thermal circuits which are under the influence of transient potentials. The transient heat transfer systems considered are as follows: I. A heat meter suddenly placed upon a hot surface; II. A heat meter mounted upon the interior surface of the cabin wall of an uninsulated airplane, which is climbing through air of decreasing temperature; III. A heat meter mounted upon the interior surface of the composite cabin wall of an insulated airplane, which is climbing through air of decreasing temperature. Analytical and graphical solutions for cases I and II are presented. The analytical solutions were derived for idealized systems composed of lumped resistances and capacitances; the graphical solutions were effected by the Schmidt method (appendix A). In general, good agreement was obtained between the analytical and graphical solutions. The solution of the differential equations which accurately describes a composite thermal system of distributed resistances and capacitances is difficult to obtain; thus, for case III only the graphical solution is presented. This report is intended to show how analytical and graphical solutions for the transient state can be used to interpret the results obtained when heat meter readings are taken during the climb of an airplane. The solutions presented may not be directly applicable to a particular problem; however, the techniques used should serve as a guide for analyzing similar problems. NACA W-30.

PB 95462

Borgelt, Elmer H.

An improved tow-line coupler. May 1944. 5p drawings Mi $1.25 Ph $1.25

PB 81512

Brown, Vernon

Civil aircraft accident: Report on the accident to Aeronca G-AETR, which occurred on March 2, 1947 at Barrs Bay, County Down, Northern Ireland. 1947. 5p Available from British Information Service, 30 Rockefeller Plaza, New York 20, N. Y. $.20

I. Airplanes—Accidents—Gt. Brit.

PB 81511

Brown, Vernon

Civil aircraft accidents: Report on the accident to Dakota C. 47A VP-YFE, which occurred on January 25, 1947 at Croydon airport. 1947. 9p drawings, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.35

I. Airplanes—Accidents

PB 81522

Brown, Vernon

Civil aircraft accident: Report on the accident to Dakota PH-TBO, which occurred on November 6, 1946 at Shere, Surrey. 1947. 6p Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.25

I. Airplanes—Accidents—Gt. Brit.

PB 92516

Bryant, L. W. and Batson, A. S.

Experiments on the effect of transition on control characteristics, with a note on the use of transition wires. Nov 1944. 23p diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, New York $1.30

It is desired to explore the effects of transition movement on both surfaces of a modern type wing section with round-nosed control flap, mainly to arrive at a standard procedure for control testing at low Reynolds number. A procedure is suggested which would make possible a reliable conversion from model to full scale, once the true Reynolds number effect and the full-scale transitions are known. The procedure in brief is to add to the tests of the smooth wing a few extra measurements with a pair of wires not far from the leading edge (say 0.1 chord), and a further set with a single wire in the same position on the upper surface only. These extra measurements would be done over a range of incidence and control angle starting from the optimum incidence. The transition for the smooth surfaces must also be known. Two controls were tested with transition wires, one on each surface in a variety of combinations. It was noted that the effect of transition movement depends less upon the angle of incidence than upon the flap angle. But it seems clear that at high Reynolds number the natural transition on a very smooth surface would move forward more quickly with increase of incidence than with increase of flap angle: some computed pressure curves are included to support this statement. It is essential that the model tests should give sufficient data to allow an estimate to be made of the effects of "premature" transition due to surface imprefections on the full scale, and also of the asymmetric positions of transition characteristic of incidence and flap angle changes. The change over from roughly

symmetric transitions at the optimum lift coefficient to asymmetric positions will occur at an incidence or flap angle which is not the same on the model as on the full scale. The suggested extra tests with wires are intended to cater for this, and to fulfil the above two requirements for the model data. ARC RM 2164.

PB 94283

Byrne, Robert W.

Experimental construction effects in high-speed wind tunnels. Dec 1944. 14p photos, drawings, graphs Mi $1.75 Ph $2.50

An investigation has been conducted to determine the possible extent of effects of wind-tunnel constriction at high speeds for airfoils of various thickness-to-chord ratios at or near zero lift. The results indicate that a limiting test Mach number exists which is principally a function of the ratio of model thickness to tunnel height. At high Mach numbers serious construction effects occur; these effects are of such a nature that the standard calibration methods give speeds much lower than the actual test speeds. NACA L-74.

PB 94259

Campbell, John P. and Seacord, Charles L., Jr.

Determination of the stability and control characteristics of a tailless all-wing airplane model with sweep-back in the Langley free-flight tunnel. Feb 1945. 32p photos, drawings, graphs, tables Mi $2.25 Ph $5.00

An investigation to determine the power-off stability and control characteristics of a tailless all-wing airplane model with sweepback has been made in the Langley free-flight tunnel. The results of the free-flight-tunnel tests were correlated with results from force tests made at high Reynolds numbers in order to estimate the flying characteristics of the full-scale airplane. The investigation consisted of force and flight tests of a 4.3-foot-span dynamic model. The effects of flap deflection, center-of-gravity location, and addition of vertical-tail area were determined. The following conclusions were drawn from the results of the investigation: The full-scale airplane will undergo a serious reduction in stick-fixed longitudinal stability at high lift coefficients unless early wing-tip stalling is eliminated. The directional stability of an all-wing airplane without vertical tail surfaces will be undesirably low. The effective dihedral of an airplane of this type should be kept low. An elevon and rudder control system similar to that used on this design should provide sufficient control. NACA L-50.

PB 94264

Cambell, John P. and Paulson, John W.

Effects of static margin and rotational damping in pitch on the longitudinal stability characteristics of an airplane as determined by tests of a model in the NACA free-flight tunnel. Jun 1944. 19p photo, drawing, graphs, tables Mi $1.75 Ph $2.50

The effects of static margin and rotational damping in pitch on the longitudinal stability characteristics of an airplane have been determined by flight tests of a model in the NACA free-flight tunnel. In the investigation, the rotational damping in pitch was varied over a wide range by using horizontal tails that varied in area from 0 to 24 percent of the wing area. A range of static margins from 2 to 16 percent of the mean aerodynamic chord was covered in the tests. For each test condition the model was flown and the longitudinal steadiness characteristics were noted. It was found in the investigation that longitudinal steadiness was affected to a much greater extent by changes in static margin than by changes in rotational damping. The best longitudinal steadiness was noted at large values of static margin. For all values of rotational damping, the steadiness of the model decreased as the static margin was reduced. The model was especially unsteady at low values of static margin (0.03 or less). Reduction in rotational damping had little effect on longitudinal steadiness, except that with low values of static margin (0.03 or less) the longitudinal divergences were sometimes more violent with the tailless (low rotational damping) condition. In the applications of the model test results to full-scale airplanes the small scale of the model and the method of control make the model tests conservative; that is, the steadiness of the airplane is expected to be somewhat greater than that of the model for given values of static margin and rotational damping in pitch. The model test results indicate that the tailless airplane, in spite of its low rotational damping in pitch, should have longitudinal steadiness characteristics similar to those of a conventional airplane with the same amount of static margin, provided the static margin is greater than 0.03. NACA L-55.

PB 94526

Campbell, Paul J.

Tests of exhaust propulsion nozzles. May 1943. 24p drawings, graphs Mi $2.00 Ph $3.75

The thrust produced by a variety of exhaust stacks and nozzles, and the effect of these stacks and nozzles on the power of a single-cylinder R-2800 engine were investigated over a wide range of engine speeds and manifold pressures in a series of tests in the Pratt & Whitney experimental test department. From the data obtained it is possible to estimate the optimum form of nozzles and the available thrust for airplanes fitted with R-2800 engines under sea-level conditions. NACA W-43.

PB 94970

Canada. Dept. of External Affairs.

Canada spreads its wings. May 1948. 36p photos, maps Mi $2.25 Ph $5.00

PB 94431

Cohn, Doris

Theoretical distribution of load over a swept-back wing. Oct 1942. 8p drawing, graph Mi $1.25 Ph $1.25

The load over an elliptical wing with 30° sweepback has been calculated by a method, based on vortex theory, which takes account of the chordwise distribution of lifting area. The theory indicated a 14-percent loss in total lift due to the introduction of sweepback, with the greatest loss taking place at the center of the span. An increase in concentration of load at the tips is also indicated. The results are compared with results previously obtained by somewhat simpler calculations based on the assumption of a single lifting vortex. NACA L-221.

PB 93963

Collar, A. R. and Broadbent, E. G.

Rolling power of an elastic wing. Oct 1945. 39p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, New York. $2.05

Part I of the present report describes an iteration process for the determination of the rolling power at any forward speed of an elastic wing-aileron combination: it is based on a method previously developed for the determination of the critical speed for aileron reversal. An example is given, and the results are compared with those found from flight tests. A comparison with an exact theoretical solution shows the process to give accurate results, the accuracy being effectively determined by the accuracy of the aerodynamic and elastic data. It is shown that the process can take account of the effective torsional stiffness in a way that is not possible in a semi-rigid representation, if the mid-aileron stiffness as found in an ordinary stiffness test is used. In the development and demonstration of the method in Part I it is assumed for simplicity that compressibility effects are absent. It is concluded that the process, though rather more lengthy than that of the semi-rigid approach, is particularly suitable where the best possible accuracy is desired, or where unusual distributions of air force or elasticity give rise to doubts as to the suitability of a conventional semi-rigid representation. In Part II of the report the question of compressibility effects is taken up. It is assumed that the aerodynamic coefficients are functions of Mach number, and the appropriate extensions are given for the case where the variation is continuous but otherwise arbitrary. The method is especially simple when the variation is assumed to follow the Glauert law in the subsonic range and to be given by Collar's formula in the supersonic range. A comparison with flight tests on a Mustang shows good agreement up to about $M = 0.8$. It is shown that there will be a considerable drop in rolling power through the sonic region even though the wing is very stiff; there will be a slight recovery of rolling power as the speed increases into the supersonic region, but the rolling power remains relatively small. For a less stiff wing there may well be no positive control above a Mach number just less than unity. An Appendix to the report shows that the process employed can be regarded as effectively one of matrix iteration, and discusses the convergence of the process from this angle. ARC RM 2186.

PB 94440

Conway, Robert N. and Maynard, Julian D.

Wind-tunnel tests of four full-scale seaplane floats. Jul 1943. 46p photos, drawings, graphs, table Mi $2.50 Ph $6.25

Wind-tunnel tests of four full-scale seaplane floats were made at the request of the Bureau of Aeronautics to determine the aerodynamic characteristics of the floats and to evaluate several drag-reducing refinements. The floats were designated Edo model OS2U-2-68F, Edo model OS2U-2-68, Vought-Sikorsky model OS2U-1, and Edo model 62-6560. The first two floats differed only in such external details as flush rivets. The last-named float was of the type used on twin-float installations. The variation of lift, drag, and pitching moment with pitch angle is presented for each float. In addition, tabulated results show the change in drag of the floats caused by the presence of various float fittings and also the reduction in drag made possible by the application of step fairings and other less extensive modifications. The effect of decreasing the depth of the step is also shown. The results of these tests indicated that a radical change in the float design was necessary to obtain a worthwhile reduction in float drag. A step fairing which might conceivably be made retractable reduced the drag of the Edo 68F float more than 10 percent, and a 4-foot tail extension on the blunt-stern Edo 62-6560 float reduced the drag 8 percent. The flow of air over the floats was shown to be so turbulent that minor refinements, such as flush rivets and recessed fittings, would not appreciably reduce the drag. The accumulated reduction in drag resulting from the use of several minor refinements might, however, be sufficient to justify their employment on a float to be used on a high-speed airplane. NACA L-238.

PB 94445

Carson, Blake W.

Belt method for measuring pressure distribution. Feb 1943. 6p photo, diagr, graph Mi $1.25 Ph $1.25

The measurement of pressure distribution may be accomplished rapidly for any number of locations deemed necessary in model or full-scale investigations by use of the "belt" method. Reasonable accuracy may be obtained by careful use of this method. NACA L-244.

PB 94276

Crate, Harold and others.

Effect of internal pressure on the buckling stress of thin-walled circular cylinders under

torsion. May 1944. 24p photos, drawings, graphs Mi $2.00 Ph $3.75

The results of a series of tests to determine the effect of internal pressure on the buckling load of a thin cylinder under an applied torque indicated that internal pressure raises the shear buckling stress. The experimental results were analyzed with the aid of previously developed theory and a simple interaction formula was derived. NACA L-67.

PB 94548

Davidson, Kenneth S. M. and others.

Porpoising, a comparison of theory with experiment. Jul 1943. 42p graphs, tables Mi $2.50 Ph $6.25

This report makes a direct comparison between the observed and the calculated longitudinal dynamic stability of a particular dynamic model of a flying boat moving on the water. Good agreement was obtained between experiment and theory (using Glauert's statement of the theory) for trim angles in the vicinity of the lower limit, at one speed a little above the hump. The agreement is shown in the following tabulation, which gives the experimental and theoretical values of the aerodynamic component of the pitch-damping derivative M_q required for stability at various trim angles, at the speed in question.

Required Aerodynamic M_q for Stability at Various Steady-Motion Trim Angles at One Speed

Steady-motion trim angle (deg)	Required aerodynamic M_q	
	Experiment	Theory
5.8	-21.1	-21.5
6.4	-17.6	-16.2
7.1	-12.0	-11.3
8.3	- 5.8	- 5.3
11.0	- .5	- 2.0

Data are given in an appendix from which similar trials of the correspondence between experiment and theory might be made for trim angles in the vicinity of the upper limit at the same speed, and for a higher speed. The calculations have not been completed for these cases, however, because it became apparent that the calculated stability could not be expected to be as reliable for upper-limit trim angles as for lower-limit trim angles, and because the theory had not particularly recommended itself in the initial trial. The theoretical method in its present form is laborious; it depends for its application upon experimental constants which are not more easily determined than a direct experimental determination of stability, and it has not yet shown itself capable of pointing out design trends tending to reduce instability to any greater extent than the direct experimental method. NACA W-65.

—62133

PB 94550

Davidson, Kenneth S. M. and Locke, F. W. S.

Some systematic model experiments on the porpoising characteristics of flying-boat hulls. Jun 1943. 73p photo, drawings, graph, tables Mi $3.50 Ph $10.00

This report presents the results of systematic model experiments on the hydrodynamic characteristics of flying boats, aimed primarily at developing a comprehensive view of the factors influencing porpoising and of their relative importance. The experiments "radiated" from a given reference ship; they embrace changes, over reasonably wide ranges, in the value of each of a number of variables, treated independently. The experimental results are summarized in a series of 25 figures, each of which gives the complete data for all the modifications of one variable. The results are further condensed for easy reference in charts 1 to 3, which follow the Summary. In these charts the principal portions of the summary figures are reproduced at smaller scale and are arranged in groups according to the type of the variable they represent. Here the relative influence of the variables is brought out merely by the relative "blackness" of the charts. The major conclusions which follow are based upon the ranges of change of the variables indicated on the summary figures: 1. The stability limits for a given hull under various loadings and aerodynamic conditions are determined (1) primarily by the three variables which govern the load on the water in steady motion—gross load Δ_0, wing lift at arbitrary trim angle Z_0, and rate of change of lift with trim Z_θ and (2) secondarily by the tail damping rate M_q. Increasing the water-borne load raises both limits without materially affecting the width of the stable range; increasing the tail damping rate lowers the lower limit at high speeds—the magnitude of the effect being greatest, however, at damping rates considerably below normal. 2. Alterations to the afterbody, under given loading and aerodynamic conditions, may alter the upper limit and the peak value of the lower limit in the vicinity of the hump; they do not alter the lower limit at higher speeds. The hump trim and the hump resistance in steady motion follow the variation of the peak of the lower limit. Assuming a reasonable length, the most powerful afterbody variable in the angle between a prolongation of the forebody keel and a line joining the tip of the main step with the tip of the stern post. Increasing this angle raises the hump trim and resistance and the upper limit of stability; if carried far enough, it will suppress upper-limit porpoising at high speeds. Increasing the step height also suppresses upper-limit porpoising at high speeds. 3. Alterations to the forebody, under given loading and aerodynamic conditions, may alter both limits but tend to affect principally the lower limit at high speeds. If sufficient forebody length to provide flotation and to prevent diving at low

speeds is assumed, the most powerful forebody variable is the amount of warping of the bottom in the region just ahead of the main step. Increasing the warping lowers the lower limit at high speeds but raises the hump resistance. 4. Finally, as a tentative, very broad conclusion: None of the modifications considered in the experiments was successful in eliminating completely either upper-limit or lower-limit porpoising and, in general, modifications which tended to improve the porpoising characteristics tended to injure the resistance characteristics. Modifications of the loading or of the aerodynamic conditions (that is, of the variable of groups I and II shown in charts 1 and 2) were found not to affect the characteristics appreciably except as they influenced the net water-borne load; modifications of the hull form (taking group III, chart 3, in its entirety) and larger effects, but these modifications were mainly variations on a given parent form. It follows that any significant improvement in both porpoising and resistance characteristics must depend upon improving the basic parent form of the hull. NACA W-67.

PB 94379

Dawson, John R. and Wadlin, Kenneth L.

Preliminary tank tests with planing-tail seaplane hulls. Jun 1943. 28p drawings, graphs Mi $2.00 Ph $3.75

Preliminary tests have been made with simplified models of two types of hulls that differ considerably from conventional types. In both of the new types there is a single main planing surface that is combined with after-planing surfaces placed directly below the aerodynamic tail surfaces. One type has twin-tail extensions supporting the planing surfaces and the other has a single-tail extension. The type of hull that has twin tails can be arranged in such a manner that the air drag probably could be made lower than that of the equivalent conventional hull, although at the expense of increased water resistance. The structural problems inherent in the arrangement may, however, be prohibitive. The type of haul that has a single tail is found to give lower resistance than conventional hulls and has desirable trim characteristics. Indications are that the stability characteristics would be satisfactory. Hulls with planing tails, however, have high trims at rest, have less room for useful load aft of the center of gravity than conventional hulls, and introduce restrictions on the types of tail surfaces that may be used. NACA L- 167.

PB 94320

Drake, Hubert M.

Effect of lateral area on the lateral stability and control characteristics of an airplane as determined by tests of a model in the Langley free-flight tunnel. Feb 1946. 20p photos, drawings, graphs, table Mi $1.75 Ph $2.50

The effects of large variations of lateral area on the lateral stability and control characteristics of a free-flying model when ailerons are used as the principal control wave been determined by flight tests in the Langley free-flight tunnel. The effects of the lateral-force parameter C_{Y_β} (rate of change of lateral-force coefficient with angle of sideslip) were investigated for a wide range of values of the directional-stability parameter C_{n_β} (rate of change of yawing-moment coefficient with angle of sideslip) and the rotary-damping-in-yaw parameter C_{n_r} (rate of change of yawing-moment coefficient with yawing angular velocity). Although large values of C_{Y_β} were found to increase the lateral stability, a definitely undesirable effect was obtained with large values of this parameter when ailerons were used to raise a low wing or to make a banked turn. With large amounts of lateral area the adverse yaw accompanying aileron rolls created adverse side forces of sufficient magnitude to interfere with the aileron control. This action was particularly objectionable for low values of C_{n_β} and C_{n_r}. It is indicated that decreasing C_{Y_β} will improve the over-all lateral flight behavior. NACA L-103.

PB 92558

Fage, A. and Sargent, R. F.

Design of suction slots. Feb 1944. 33p drawings, graphs, table Available from British Information Services, 30 Rockefeller Plaza, New York 20, New York $1.75

Part I of this report describes experiments, based on visual observations of flow, made to determine the optimum entry shape of a two-dimensional slot suitable for laminar boundary-layer suction. The optimum entry shape, for a given rate of suction, is defined as that for which the velocity of flow into the entry is the lowest possible when it just flows full separation from the front lip is imminent. An entry shape is specified by the throat width, w, the radii of curvature, r_1 and r_2, of the front and back lips respectively, and the angle β between the slot axis and the tangent to the surface in the upstream direction. The observations were made for three values, 0.5, 0.8 and 1.4 of the ratio of the rate at which air is sucked into the slot to the rate of flow in the boundary layer, and for β = 15, 30, 34, 90 and 135 deg. The entry flow is not sensitive to r_2/w. The optimum value of r_1/w increase with β and with the rate of suction. The optimum value of the velocity in an entry throat becomes smaller with an increase in β. A forward-facing slot, $\beta > 90$ deg., has therefore a lower resistance to entry flow than a backward-facing slot, $\beta < 90$ deg. Graphs for use in the design of an optimum slot entry are given, Figs. 6-8. Part II describes experiments made for slots on the wall of a straight circular pipe. The experimental technique used is based on pressure and velocity measurements in a slot, just beyond the entry. The work has been undertaken to obtain (i) a check, from observations made at higher speeds of laminar flow, on the conclusions in Part I, (ii) the optimum entry shapes of slots for incompressible

turbulent boundary-layer suction, (iii) information on slot entries suitable for turbulent boundary-layer suction at high speeds and on choke conditions of flow. The conclusions are: — (i) The graphs given in Part I can be accepted for higher speeds of laminar flow, Figs. 26 and 28. (ii) The graphs can be used for turbulent boundary-layer suction, incompressible flow, Figs. 26 and 28. (iii) The optimum throat width for compressible turbulent flow and no choke, expressed as a fraction of the boundary-layer thickness, is smaller than for incompressible flow, Table 5. (iv) The choke width, w_c, is given by $\frac{w_c}{\sigma} = \frac{m_c}{m} \frac{U_s}{a}$, where σ is the boundary-layer thickness, m_c is the rate of mass delivery, m is the rate of mass-flow in the boundary layer, U_s is the velocity just outside the boundary layer at the slot position and a is the sonic velocity for isentropic flow, Table 6. (v) the choke width is independent of the slot angle, but whilst a forward-facing slot designed, for high-speed flow and a medium rate of delivery, to have an optimum entry width, as defined above, may not choke at a higher rate of delivery, a backward-facing slot is likely to choke, Figs. 27 and 29. ARC RM 2127.

PB 94475

Fairbanks, Richard M. and Alexander, Sidney R.

Wind-tunnel tests of two tapered wings with straight leading edges and with constant-chord center sections of different spans. Oct 1943. 30p photos, drawings, graphs Mi $2.00 Ph $3.75

An investigation was conducted in the NACA 19-foot pressure tunnel of two-tapered wings with NACA 230-series airfoil sections, straight leading edges, and constant-chord center sections. The spans, areas, and root chords of both wings were equal. The center-section span of one wing was equal to the root chord; whereas the center-section span of the other was equal to twice the root chord. Both wings were equipped with partial- and full-span simple split flaps. Lift, drag, and pitching-moment coefficients were determined for the plain wing and for each flap arrangement through a test Reynolds number range of 2,600,000 to 4,700,000. Stalling characteristics were determined for the plain wings and with flaps deflected 60°. The results of this investigation indicate that the wing with the square center section has greater maximum lift coefficients and greater increments of maximum lift due to flap deflections than the wing with the rectangular center section. The difference in drag coefficient for the plain wings is not appreciable. The aerodynamic-center locations were determined as 0.239 of the mean chord back of the leading edge for the wing with square center sections and 0.244 of the mean chord for the wing with rectangular center section. Stall progressions starting at the center section and working outboard were indicated for both wings. Deflecting the flaps on both wings resulted in a sudden stall. NACA L-311.

—62133

PB 95509

Falkner, V. M. and Darwin, Sir Charles

Design of minimum drag inboard fins, with appendix: On the conformal transformation of a wing with symmetrical inboard fins. Oct 1945. 15p tables, drawings Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.00

The work is an extension of a recent investigation into the design of minimum drag tip fins. It is shown that the previous theory will also cover the case of a single upper or lower inboard fin, while a modification now given allows of an extension to equal upper and lower inboard fins. A range of solutions for each case, covering different heights of fin and positions of fin on the span, has been calculated and is given in tabular and graphical form. The procedure by which the wing characteristics are calculated is described. A comparison is also given for one wing with a single inboard fin of the circulation with and without the fin in position in order to show the probable effect of retracting a fin. ARC RM 2280.

PB 94221

Fehlner, Leo F. and MacLachlan, Robert

Investigation of effect of sideslip on lateral stability characteristics. I. Circular fuselage with variations in vertical-tail area and tail length with and without horizontal tail surface. May 1944. 35p drawings, graphs, tables Mi $2.25 Ph $5.00

The results of tests of a circular fuselage with various combinations of tail lengths and vertical tail surfaces with and without the horizontal tail surface in the 6- by 6-foot test section of the NACA stability tunnel are reported in the form of diagrams of variation of coefficients of lateral force and yawing moment with angle of yaw and angle of attack. The results of these tests indicated that the change in the unstable yawing moment of the fuselage alone due to increased tail length did not appreciably affect the yawing moment of a fuselage and vertical-tail combination. The addition of a horizontal tail increased the efficiency of the vertical tail in normal-flight attitudes and in the region of negative angles of attack. Existing methods of computing tail effectiveness gave results within ±7 percent of the measured values for the cases computed. NACA L-12.

PB 94450

Fehlner, Leo F.

Study of the effects of radii of gyration and altitude of aileron effectiveness at high speed. Apr 1943. 10p graphs, table Mi $1.25 Ph $1.25

1. Ailerons—Performance
2. NACA L-249

PB 94355

Ferri, Antonio

Completed tabulation in the United States of tests of 24 airfoils at high mach numbers (Derived from interrupted work at Guidonia, Italy in the 1.31- by 1.74-foot high-speed tunnel). Jun 1945. 170p drawings, graphs, tables Mi $6.25 Ph $21.25

Two-dimensional data for 24 airfoil sections tested in the 1.31- by 1.74-foot high-speed tunnel at Guidonia, Italy, are presented. The test Mach numbers ranged from 0.40 to 0.94 and the test Reynolds numbers from 340,000 to 420,000. The results indicate that thickness ratio is the dominating shape parameter at very high Mach numbers and that important aerodynamic advantages are to be gained by using the thinnest possible sections. The results of preliminary tests made to investigate the effects of jet boundaries, Reynolds number, and humidity at very high speeds are also presented. It was found that the jet-boundary effects became very large at high Mach numbers when models large with respect to the tunnel height were used. In the absence of suitable correction factors for large models it was considered essential to use models small enough to make the jet-boundary effects negligible. It was indicated that the data presented for the 24 airfoils tested are essentially free from jet-boundary and humidity effects. NACA L-143.

PB 92495

Fine, M. and Williams D.

Stress concentration due to four-point fixing at front end of monocoque fuselage, theoretical analysis. Apr 1941. 30p diagrs, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, New York $1.60

This report is a sequel to previous work by Williams, Starkey and Taylor (R. & M. 2098) and by Williams and Fine (R. & M. 2099) and treats the problem of the stress distribution in a stringer-reinforced cylindrical shell (representing a modern monocoque fuselage) under transverse loads when the reactions at the supported end are provided by four fixing points. It is assumed that these reactions are transmitted to the shell through four heavy longitudinal members, or longerons, and the purpose of the report is to discuss the manner in which the load in these members is passed on via the skin to the adjacent stringers. Two cases are considered. In the first the longerons are assumed to be of constant cosss-section and to extend from end to end of the shell. In the second the longerons are tapered from the root outwards in such a way as to maintain a constant stress. Appendices I and III of the report treat the problems with some rigour and the solutions obtained are made the bases of quick approximate methods that can be applied with facility to any practical case. The results obtained by the approximate methods agree very satisfactorily with those derived by the far longer basic method. From working out typical cases it is inferred that for the end-to-end constant-section longerons the disturbance due to the four-point fixing does not extend a greater distance from the root fixing than 1/2 to 3/4 of the average root diameter, this distance being greater the greater the value of the ratio of total stringer area to total skin area in the cross-section. It is found that the constant-stress longeron tapers very quickly and appears to offer a good practical basis for design. The most important stress concentration in both cases is the shear stress in the skin immediately adjacent to the longerons at their root ends, and reinforcement of the skin thickness in this region is probably essential in all practical cases, especially for the constant stress longeron. The extent of this stress concentration is indicated by certain contour diagrams of stress distribution included in this report. ARC RM 2100.

PB 94261

Fischel, Jack

Hinge moments of sealed-internal-balance arrangements for control surfaces. II. Experimental investigation of fabric seals in the presence of a thin-plate overhang. Aug 1945. 52p photos, drawings, graphs, tables Mi $2.75 Ph $7.50

Tests were made in a seal test chamber to determine the hinge moments contributed by the fabric seal in an internal-balance arrangement employing a thin-plate overhang. These tests were performed with various widths of fabric sealing various widths of flap-nose gap, with a horizontal, a vertical, and a circular type of wing structure forward of the balance, and with various heights of balance chamber. This investigation is an experimental verification and extension of a previous analytical investigation. The present investigation indicated that the moment of the seal may be a balancing or an unbalacing moment and may be an appreciable part of the total balancing moment of an internally balanced flap, depending on the overhang deflection and the configuration of the internal balance. Variation of the width of the fabric seal, the sealed gap, or the location of the seal attachment to the wing structure affected the seal moments through most of the overhang deflection range. The shape and size of the balance chamber affected the seal-moment characteristics in the deflection range where the seals contacted and were constrained by the chamber walls; the values of the seal moments were usually reduced when the seals were constrained. The results indicated also that an optimum balance configuration would employ a seal width such that the seal would barely touch the chamber ceiling when maximum overhang deflection is attached. NACA L-52.

PB 94216

Fischel, Jack and Riebe, John M.

Wind-tunnel investigation of an NACA 23021 airfoil with a 0.32-airfoil-chord double slotted flap. Oct 1944. 57 p drawings, graphs, tables Mi $2.75 Ph $7.50

An investigation was made in the LMAL 7- by 10-foot wind tunnel of an NACA 23021 airfoil with a double slotted flap having a chord 32 percent of the airfoil chord (0.32c) to determine the aerodynamic section characteristics with the flaps deflected at various positions. The effects of moving the fore flap and rear flap as a unit and of deflecting or removing the lower lip of the slot were also determined. Three positions were selected for the fore flap and at each position the maximum lift of the airfoil was obtained with the fore flap deflected 30° in the most extended position. This arrangement provided a maximum section lift coefficient of 3.31, which was higher than the value obtained with either a 0.2566c or a 0.40c single-slotted-flap arrangement and 0.25 less than the value obtained with a 0.40c double-slotted-flap arrangement on the same airfoil. The values of the profile-drag coefficient obtained with the 0.32c double slotted flap were larger than those for the 0.2566c or 0.40c single slotted flaps for section lift coefficients between 1.0 and approximately 2.7. At all values of the section lift coefficient above 1.0, the 0.40c double slotted flap had a lower profile drag than the 0.32c double slotted flap. At various values of the maximum section lift coefficient produced by various flap deflections, the 0.32c double slotted flap gave negative section pitching-moment coefficients that were higher than those of other slotted flaps on the same airfoil. The 0.32c double slotted flaps gave approximately the same maximum section lift coefficients as, but higher profile drag coefficients over the entire lift range than, a similar arrangement of a 0.30c double slotted flap on an NACA 23012 airfoil. NACA L-7.

PB 94353

Fullmer, Felicien F., Jr.

Wind-tunnel investigation of NACA 66(215)-216, 66, I-212, and 65_1-212 airfoils with 0.20-airfoil-chord split flaps. Jul 1944. 13p drawing, graphs, table Mi $1.75 Ph $2.50

An investigation was carried out in the NACA two-dimensional low-turbulence pressure tunnel of the NACA 66(215)-216, 66, I-212, and 65_1-212 airfoil sections equipped with split flaps having chords 20 percent of the airfoil chord. The purpose was to determine the maximum-lift characteristics of these low-drag airfoil sections with split flaps. All the present tests were made at a Reynolds number of approximately 6×10^6 and a Mach number of about 0.15. The maximum lift coefficients of these airfoils without and with flaps are summarized as follows:

Airfoil section	Maximum section lift coefficient		Flap deflection (deg)
	Without flaps	With flaps	
NACA 66(215)-216	1.56	2.61	70
NACA 66, I-212	1.41	2.17	70
NACA 65_1-212	1.49	2.15	60

NACA L-140.

—62133

PB 94398

Garner, I. Elizabeth

Wind-tunnel investigation of control-surface characteristics. XX. Plain and balanced flaps on an NACA 0009 rectangular semispan tail surface. Oct 1944. 56p drawings, graphs, tables Mi $2.75 Ph $7.50

Force-test measurements have been made in the Langley 4- by 6-foot vertical tunnel to determine the aerodynamic characteristics of an NACA 0009 semispan tail surface of rectangular plan form equipped with flaps of various nose shapes and overhangs. The flap chord was 30 percent of the airfoil chord. A few tests were made to determine the effectiveness of a balancing tab on various flap arrangements. The test results indicated that the slope of the lift curve was affected little by the amount of overhand and the balance nose shape but was increased by sealing the gap at the flap nose. At zero angle of attack, the variation of lift with flap deflection for the sealed-gap condition was the same as or slightly greater than for the unsealed-gap condition. The change in the hinge-moment coefficient with angle of attack or with flap deflection generally was made more negative with sealing the gap. The effectiveness of the balancing tab in reducing the flap hinge-moment coefficients was approximately the same for both the sealed plain flap and the unsealed 35-percent-flap-chord elliptical overhang; also, the variation of lift coefficient with tab deflection was about equal for the plain flap and for the flap with aerodynamic balance. In three-dimensional flow, the measured values of the lift-curve slope were slightly lower and the measured values of the hinge-moment parameters were more positive than the values of the parameters calculated from the data of previous investigations in two-dimensional flow by lifting-line theory, modified by the edge-velocity correction. Application of aspect-ratio corrections determined from a lifting-surface-theory solution for an elliptical wing made the computed values of the variation of the hinge-moment coefficient with angle of attack very closely approach the measured values. NACA L-186.

PB 94359

Garrick, I. E. and Kaplan, Carl

Flow of a compressible fluid by the hodograph method. II. Fundamental set of particular flow solutions of the chaplygin differential equation. Nov 1944. 59p graphs, tables Mi $2.75 Ph $7.50

The differential equation of Chapylgin's jet problem is utilized to give a systematic development of particular solutions of the hodograph flow equations, which extends the treatment of Chapylgin into the supersonic range and completes the set of particular solutions. The particular solutions serve to place on a reasonable basis the use of velocity correction formulas for the comparison of incompressible and compressible flows. It is shown that the geometric-mean type of velocity correction formula

introduced in an earlier paper, part I, has significance as an over-all type of approximation in the subsonic range. A brief review of general conditions limiting the potential flow of an adiabatic compressible fluid is given and application is made to the particular solutions, yielding conditions for the existence of singular loci in the supersonic range. The combining of particular solutions in accordance with prescribed boundary flow conditions is not treated in the present paper. NACA L-147.

PB 92617

Gates, S. B. and Lyon, H. M.

Continuation of longitudinal stability and control analysis, Part I. General theory. Feb 1944. 36p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, New York $1.90

The theory of longitudinal stability and control is presented in an extended form so as to include in one general framework the analysis of the effects of structural distortion or compressibility at moderately high speeds and of slipstream at low speeds. Its application to conditions at high Mach numbers beyond the shock stall is doubtful, since it remains a first order theory. It is shown that stability and handling qualities are mainly determined by the values of 1. Static margin. K_n (or K_n'), proportional to the stick travel (or force) to trim in straight flight in a slightly higher or lower speed than the initial trimmed speed. 2. Manoeuvre margin. H_m (or H_m'), proportional to the stick travel (or force) to maintain flight in a steady circular path at a given acceleration at constant speed. H_m is equal to the distance of the C.G. ahead of the manoeuvre point, i.e. the point where H_m 0, and may be considerably greater or less than the static margin. K_n vanishes at the neutral point, but is not in general equal to the distance of the C. G. ahead of it. Dangerous dynamic instability accompanies a negative H_m, but the divergence associated with even a large negative K_n is relatively slow so long as H_m is positive. The validity of the approximate theory of response in a pull-out from a dive is discussed with special reference to the manoeuvrability criteria, "stick force or travel per 'g'." It is concluded that the assumption of constant speed during the manoeuvre is justified, and the behaviour is therefore practically independent of K_n and depends only on H_m. For small manoeuvre margins, however, the criteria based on a steady acceleration have little practical significance because of the excessive length of time necessary to reach a steady condition in an actual pull-out. For such cases a revised criterion is needed, based possibly on a reasonable time interval. A more detailed summary of the results is given in Sect. 6. ARC RM 2027.

PB 94338

Gillis, Clarence L. and others.

Charts for determining Jet-boundary corrections for complete models in 7- by 10-foot closed rectangular wind tunnels. Sep 1945. 30p graphs, table Mi $2.00 Ph $3.75

Numerical values of the jet-boundary corrections to the angle of attack and the induced-drag, rolling-moment, and yawing-moment coefficients have been calculated for complete airplane or wing models in 7- by 10-foot closed rectangular wind tunnels. Variations in aspect ratio, taper ratio, wing area, wing span, flap span, aileron span, and vertical location of the wing in the tunnel were included in the computations. The numerical values of the corrections were obtained by a graphical-integration process that permitted the use of the actual span loading and spanwise variation of upwash velocity. The corrections are given in equations containing correction factors that are presented in the form of easily used charts. The results showed that the wing area was the most important variable, as has usually been assumed in previous calculations. When the corrections were based on wing area, the effect of most of the other variables was negligible. A comparison of the corrections for tunnels of several different shapes showed that, for geometrically similar wings having the same ratio of wing area to tunnel cross-sectional area, the corrections were very nearly the same as those for 7- by 10-foot rectangular tunnels. Correction factors and equations are presented for determining corrections to the pitching-moment coefficient, downwash angle, and wake or slipstream location. These correction factors account for wing span, tail length, and vertical location of the wing and tail in the tunnel. First-order effects of compressibility on the jet-boundary corrections are included in the charts. NACA L-123.

PB 94393

Gilruth, Robert R.

Analysis of vertical-tail loads in rolling pull-out maneuvers. Aug 1944. 6p graphs Mi $1.25 Ph $1.25

An analysis is presented of the vertical-tail loads to be expected as a result of abrupt aileron action in accelerated flight, as in rolls from turns or pull-outs, for example. The formulas derived show that the vertical-tail loads obtained in rolling pull-out maneuvers are directly proportional to the load factor, wing loading, and aileron effectiveness and are inversely proportional to directional stability. Sample calculations for an assumed fighter airplane are presented and discussed. It appears that critical tail loads may occur in rolling pull-out maneuvers, particularly on airplanes with good ailerons and low directional stability. NACA L-181.

PB 95557

Hood, Donald R. and others.

Automatic oxygen valves and couplings, expenditure order number 660-132. Sep 1948. 2p Mi $1.25 Ph $1.25

1. Valves, Oxygen 2. Couplings, Oxygen

PB 94453

Gottlieb, Robert and Mandel Merven W.

Comparison of tightness of 78° machine-countersunk rivets driven in holes prepared with 78° and 82° countersinking tools. Sep 1942. 4p drawings, graph Mi $1.25 Ph $1.25

1. Rivets—Installation
2. NACA L-252

PB 94476

Gottlieb, Robert

Effect of countersunk depth on the tightness of two types of machine-countersunk rivet. Oct 1942. 6p drawings, graphs Mi $1.25 Ph $1.25

An experimental investigation was conducted to determine the effect of countersunk depth on the tightness of two types of machine-countersunk flush rivet. The specimens tested in this study were simple lap joints made by two different riveting methods. The results of this investigation indicated that roundhead rivets inserted from the back of the joint with the countersunk heads formed in the driving of the rivets produce tighter joints over a large range of countersunk depths than ordinary machine-countersunk flush rivets. For a given sheet thickness, the tightness of the rivets with the countersunk heads formed in driving is almost independent of the depth of countersink; whereas the tightness of ordinary countersunk rivets is appreciably impaired by an increase in the depth of countersink, machine-countersunk rivets installed in the usual manner produce tighter joints if the heads of the rivets protrude above the skin surface before driving. NACA L-315.

PB 95320

Gt. Brit. Ministry of Supply.

Laboratory of the air. 1948. 83p photos, illus Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.15

1. Reconnaisance, Military—Gt. Britain
2. Photography, Aerial—Gt. Britain
3. Balloons, Observation—Gt. Britain
4. Aircraft—Gt. Britain
5. Aeronautics—Military—Gt. Britain

PB 94343

Greenberg, Harry

Calculation of stick forces for an elevator with a spring tab. Jun 1944. 20p drawings, graphs Mi $1.75 Ph $2.50

Formulas for the calculation of hinge-moment characteristics of an elevator with a spring tab have been developed in terms of basic aerodynamic parameters, spring stiffness, and air-speed. The formulas have been used in a study of the stick-force gradients on a pursuit airplane equipped with an elevator with a spring tab. Charts are presented showing the variation of stick-force gradient in accelerated flight over a large range of speed and the complete range of spring stiffness for various center-of-gravity locations, altitudes, and airplane sizes. It is shown that the stick-force gradient for the elevator with spring tab tends to decrease as the speed increases and for weak springs tends to approach the value corresponding to a pure servotab (no spring). This tendency is independent of altitude, size, or center-of-gravity location although the magnitudes vary with these parameters. The variation of stick-force gradient with center-of-gravity location is less for the spring-tab than for a linked-tab type of balance. NACA L-129.

PB 95508

Gurney, C.

The effective stress concentration at the end of a crack having regard to the atomic constitution of materials. Dec 1945. 5p graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.45

Classical theory of elasticity strictly applies only to a continuous elastic medium, but unless stress gradients are very rapid, the changes in the forces between atoms are proportional to the stresses predicted by the theory. If stress gradients are rapid as at the ends of cracks in brittle materials, an estimate of the change in the forces between atoms can be obtained by averaging the stresses predicted by elasticity theory over the volume occupied by an atom. Computation is made of the average stress over a small length Δ at the end of an elliptical crack of length $2a$, having radius r at the end of the major axis. Particular interest is centered on the case in which $\frac{\Delta}{r} = 1$. The average stress concentration caused by symmetrical stress at infinity is than about half that at the line boundary of the crack. If $r = 0$ the line boundary stress is infinite but the average stress is finite and is given by $1.8\sqrt{\frac{a}{\Delta}}$. ARC RM 2285.

PB 94372

Gustafson, F. B. and O'Sullivan, William J.

Effect of high wing loading on landing technique and distance, with experimental data for the B-26 airplane. Jan 1945. 62p photos, graphs, tables Mi $3.00 Ph $8.75

An analysis of the effect of wing loading on the landing flare (that is, the leveling-off part of the landing) indicated an important effect on landing technique and distance. In order to check this analysis, flight tests were made with a Martin B-26 airplane loaded to 50 pounds per square foot. It was found that, for reasonable accuracy and safety, the pilots used power to maintain the desire speed margin and to limit the rate of descent at the start of the flare to about 25 feet per second. Other measured values essential to flare calculations include the following: minimum consistent value of excess speed at start of flare, 25 percent; maximum ratio of lift coefficient C_L to maximum lift coefficient $C_{L_{max}}$ consistently reached, 85 percent; time required to reach this C_L, 2 seconds; time required to reduce the C_L value to that for level flight at

the end of the flare, 1 second. Since these allowances do not differ widely from those needed at low wing landings (with the exception of the definite limitation of vertical velocity), it is concluded that the effect of an increase in wing loading on the flare path, for any airplane reasonably similar to the one tested, can be satisfactorily calculated. NACA L-160.

PB 94235

Gustafson, F. B.

Effect on helicopter performance of modifications in profile-drag characteristics of rotor-blade airfoil sections. Aug 1944. 37p diagrs, graphs, tables Mi $2.25 Ph $5.00

Performance caiculations are presented for a typical helicopter rotor in which three types of airfoil section were successively used. The types represented are the rough conventional, the smooth conventional, and the laminar-flow or low-drag sections as developed for helicopter use. The performance items covered are rotor thrust for fixed power in hovering, range and endurance at cruising speed, and power required at a relatively high forward speed. Contours showing the conditions of operation encountered by the blade section and weighting curves showing the relative importance of the various section angles of attack for specified flight conditions are included as an aid in the interpretation of the results. The calculations indicated that the use of a smooth conventional section will result in marked performance gains throughout the flight range. Definite, though smaller, additional gains in take-off weight and in range and endurance may be realized by the use of a low-drag section. At high forward speeds or at moderate forward speeds and high loadings, however, losses are indicated for the low-drag sections in contrast with the smooth conventional sections. It is demonstrated that, if these losses are to be avoided, the low-drag sections must be designed to avoid the extreme rise in drag coefficient at the higher angles of attack which is characteristic of the low-drag sections now available for use in helicopters. NACA L-26.

PB 94446

Gustafsen, F. B.

Tire friction coefficients and their relation to ground-run distance in landing. JUn 1942. 17p graphs Mi $1.75 Ph $2.50

A summary of published information on braking friction coefficients is presented. An analysis is included which indicates that the magnitude of the friction coefficient available will affect the technique required for obtaining the shortest ground run only under extreme conditions. In this connection, technique refers to the choice between utilizing air drag and ground friction through choice of attitude. The analysis further shows that the landing attitude is almost never the attitude for the shortest ground run. A chart is presented for rapid estimation of ground-run distance for any set of values of friction coefficient, airplane attitude, initial drag-weight ratio, and initial velocity. Sample studies are presented for high- and low-wing loadings. NACA L- 245.

PB 93952

Holliday, A. S. and others.

Investigation of the effect of change of section on rudder hinge moments. Aug 1941. 17p diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, New York $1.00

In the course of their design of a high aspect ratio fin and rudders a firm raised the question as to whether, with a given thickness of rudder post, it would be preferable to choose a fin and rudder section with maximum ordinate far fack or to choose a section of greater thickness-chord ratio with maximum ordinate at 30 percent of the total chord. This question appeared to be of sufficient interest and importance to warrant a special test. Accordingly two models were made to the same outline drawing supplied by the firm. One had a 15 per cent. maximum section at 30 per cent. from the leading edge, that is section 1530. The other one was a "high-speed" section with 12 per cent. thickness, 50 per cent. from the leading edge, denoted conveniently by 1250. These sections were chosen so that the thickness at the rudder post was the same in each case. Most of the experiments were made with transition wires near the leading edge of the fin but a few were made without. Tests were made both with and without horn balance. The results show that, with the same fin and rudder outline, the hinge moments depended primarily on the section of the rudder and not on that of the fin. The 1250 rudder was thicker by 1 1/2 per cent. of the rudder chord than the other and the minimum value of $-b_2$ was less by 0.15. The size of horn suggested by the firm is too large since it brings the thinner rudder too near neutral balance, whilst the thicker rudder is almost over-balanced with no horn at all. ARC RM 2184.

PB 94407

Harmon, Sidney M.

Comparison of fixed-stabilizer, adjustable-stabilizer and all-movable horizontal tails. Oct 1945. 34p drawing, graph, tables Mi $2.25 Ph $5.00

An analysis is presented to compare longitudinal stability and control characteristics obtained with a conventional fixed-stabilizer, an adjustable-stabilizer, and an all-movable horizontal tail. The tail-area requirements, control forces required in the critical landing condition, static margin, control-force gradients in a dive recovery, and elevator-free stability are investigated. The analysis includes a comparison for the various tails of the effect of a partial-wing stall on the control-force gradient in a dive-recovery. The effect of an increase in the tail aspect ratio is also investigated.

The results of the analysis indicated that, with regard to requirements for longitudinal static stability and adequate control in landing, the all-moveable and adjustable-stabilizer tails can provide with considerably smaller tail areas, the same range of permissible center-of-gravity positions as the conventional fixed-stabilizer tail. The comparison of the longitudinal control characteristics on the basis of a specified range of permissible center-of-gravity positions indicated that the adjustable-stabilizer tail allows considerably smaller control balance for the rate of change of hinge-moment coefficient with elevator deflection than the fixed-stabilizer tail. The comparison also indicated that the increase in control-force gradient as a result of a partial-wing stall in a dive recovery will be significantly smaller with the all-movable and adjustable-stabilizer tails than with the conventional fixed-stabilizer tail. NACA L-195.

PB 94538

Hartmann, E. C. and others.

Fatigue tests of riveted joints—Progress reports of tests of 17S-T and 53S-T joints. Sep 1944. 32p photos, graphs, tables Mi $2.25 Ph $5.00

1. Joints, Riveted—Tests
2. NACA W-55

PB 94385

Heimerl, George J. and Roy, J. Albert

Column and plate compressive strengths of aircraft structural materials. Jul 1945. 23p photo, drawings, graphs, tables Mi $2.00 Ph $3.75

Column and plate compressive strengths of extruded 75S-T aluminum alloy were determined both within and beyond the elastic range from tests of thin-strip columns and local-instability tests of H-, Z-, and channel-section columns. These tests are part of an extensive research investigation to provide data on the structural strength of various aircraft materials. The results, which are presented in the form of curves and charts that are suitable for use in the design and analysis of aircraft structures, supersede preliminary results published previously. NACA L-173.

PB 94241

Heimerl, George J. and Roy, J. Albert

Column and plate compressive strengths of aircraft structural materials extruded 24S-T aluminum alloy. Jul 1945. 23p photos, drawings, graphs, tables Mi $2.00 Ph $3.75

Column and plate compressive strengths of extruded 24S-T aluminum alloy were determined both within and beyond the elastic range from tests of thin-strip columns and local-instability tests of H-, Z-, and channel-section columns. These tests are part of an extensive research investigation to provide data on the structural strength of various aircraft materials. The results are presented in the form of curves and charts that are suitable for use in the design and analysis of aircraft structures. NACA L-32.

PB 92919

Hilton, W. F.

Experimental analysis of the forces on eighteen aerofoils at high speed. May 1946. 59p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, New York $3.00

The force coefficients quoted in this report represent the past five years' work on eighteen two-dimensional aerofoils in the one foot circular High Speed Tunnel at the National Physical Laboratory. The report is divided into three sections:—(a) Lift. (b) Drag. (c) Quarter-chord moment. The tests extended over a range of Mach number from 0.3 to 0.85 at Reynolds numbers of 0.3 to 0.7 millions, the exact relation between Mach number and Reynolds number being given in Fig. 9. (a) Lift.—The Glauert law is found to be quantitatively obeyed for aerofoils 6 to 16 per cent. thick. Aerofoils thicker than 20 per cent. exhibit no Glauert effect and intermediate thicknesses (16 to 20 per cent.) show a reduced Glauert effect. The lift results are plotted in a novel from showing the lift as a function of both incidence and Mach number on the same diagram which consists of two families of intersecting curves (a "carpet"). High-speed Tunnel tests are compared with Compressed Air Tunnel tests at the same Reynolds number on ten aerofoils. Zero lift angles are found to agree well with those calculated by the methodsof R. & M. 1914. (b) Drag.—The results on these aerofoils are not considered to be so reliable as those for lift and moment on account of end effects at the point where the aerofoil passes through the tunnel wall. In general it has been found that end effects are negligible for aerofoils thinner than 10 per cent. The drag results show clearly the desirability of employing thin aerofoils for postponing the shock stall. (c) Quarter-chord Moment.—The moment results have not been plotted in "carpet" form, since they are more irregular than the lift results. The experimental values of C_{m0} at low speed are in excellent agreement with those calculated by the method given in R. & M. 1914. It was not thought worth while to make detailed comparison of moment curve slopes since the moment curves themselves are not sufficiently straight to assign a definite value to the slope. A few moment curve slopes are given in Fig. 6. Non-linearity of the C_m, α curves is characteristic of aerofoils having their maximum thickness at about the half-chord. ARC RM 2058.

PB 81903

Hilton, W. F. and others.

High-speed tunnel measurements of fin-tailplane interference between EC 1040 and EC 1240 sections. May 1941. 7p Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.55

It is confirmed that the addition of a fin to an airfoil representing a tailplane produces a loss of lift and increase of drag coefficient at high subsonic speeds. ARC RM 2138.

PB 94417

Hoggard, H. Page and Bulloch, Marjorie E.

Wind-tunnel investigation of control-surface characteristics. XVI. Pressure distribution over an NACA 0009 airfoil with 0.30-airfoil-chord beveled-trailing-edge flaps. Apr 1944. 70p drawings, graphs, tables Mi $3.00 Ph $8.75

Pressure-distribution tests have been made in the NACA 4- by 6-foot vertical tunnel of a plain flap with interchangeable beveled trailing edges on an NACA 0009 airfoil. The flap chord was 30 percent of the airfoil chord and the bevel chords were 15 and 20 percent of the flap chord. The 15-percent bevel was tested with the bevel corner faired with both large and small radii. The purpose of these tests was to supply pressure-distribution data that may be used for structural and aerodynamic design of horizontal and vertical tail surfaces. The results are presented as diagrams of resultant pressure coefficients and of increments of resultant pressure coefficient for the airfoil with the flap having beveled trailing edges. The diagrams are presented for the control surface with the gap at the flap nose sealed and unsealed. A comparison of the beveled-flap pressure data with plain-flap data indicated that the addition of a bevel reduced the pressures over the entire airfoil, including the peak at the airfoil nose, and caused a reversal of pressure over the beveled part of the flap. The normal-force coefficient for the beveled-trailing-edge flap was less than the coefficient for the plain-airfoil-contour flap. The open gap produced a tendency toward overbalance by decreasing the negative pressures over the upper surface of a flap when deflected downward. The results generally were in fair agreement with force-test data previously published. NACA L-205.

PB 94217

Hollingworth, Thomas A.

Investigation of effect of sideslip on lateral stability characteristics. II. Rectangular midwing on circular fuselage with variations in vertical-tail area and fuselage length with and without horizontal tail surface. Apr 1945. 58p photos, drawings, graphs, tables Mi $2.75 Ph $7.50

Power-off tests were made in the 6-by 6-foot test section of the Langley stability tunnel to determine the variation of the static lateral stability characteristics with vertical-tail area, fuselage length, and wing dihedral. Two NACA 23012 rectangular wings with rounded tips and dihedral angles of 0° and 5° were tested alone and in combination with three circular fuselages of different lengths. The wing-fuselage combinations were tested as midwing monoplanes with and without a horizontal tail and with variations in vertical-tail area. The results are presented as curves showing the variation of the static-lateral-stability slopes with angle of attack, and the rolling-moment, yawing-moment, and lateral-force coefficients with angle of yaw. The results indicated that the wing-fuselage interference on the slope of the curve of yawing-moment coefficient against angle of yaw C_{n_ψ} and on the slope of the curve of lateral-force coefficient against angle of yaw C_{Y_ψ} was small and remained practically constant over the unstalled angle-of-attack range. In the high-speed flight range, the wing-fuselage interference on the vertical tail was small and, in the normal flight range, was not appreciably changed by an increase in fuselage length or vertical-tail area for the sizes investigated. With no vertical tail, increased fuselage length caused a negligible change in C_{n_ψ} for the fuselage lengths tested. For the complete model, C_{n_ψ} increased approximately linearly with fuselage length. The slopes C_{n_ψ} and C_{Y_ψ} increased approximately linearly with vertical-tail area. For the system of axes used, the slope of the curve of rolling-moment coefficient against angle of yaw C_{l_ψ} increased with vertical-tail area at negative and small positive angles of attack but decreased at large positive angles of attack. The results also indicated that increased dihedral angle slightly decreased the rate of change of C_{n_ψ} with vertical-tail area but had a negligible effect on the rate of change of C_{n_ψ} with fuselage length. An appreciable increase in C_{n_ψ} was caused by the end-plate effect of the horizontal tail on the vertical tail. NACA L-8.

PB 94226

Hollingworth, Thomas A.

Investigation of effect of sideslip on lateral stability characteristics. III. Rectangular low-wing on circular fuselage with variations in vertical-tail area and fuselage length with and without horizontal tail surface. Apr 1945. 51p photos, drawings, graphs, tables Mi $2.75 Ph $7.50

Power-off tests were made in the 6- by 6-foot test section of the Langley stability tunnel to determine the variation of the static lateral stability characteristics with vertical-tail area, fuselage length, and wing dihedral. Two NACA 23012 rectangular wings with rounded tips and dihedral angles of 0° and 5° were tested alone and in combination with three circular fuselages of different lengths. The wing-fuselage combinations were tested as low-wing monoplanes with and without a horizontal tail and with variations in vertical-tail area. The results are presented as curves showing the variation of the static-lateral-stability slopes with angle of attack, and the rolling-moment, yawing-moment, and lateral-force coefficients with angle of yaw. The results indicated that the influence of wing-fuselage interference on the slope of the curve of yawing-moment coefficient against angle of yaw C_{n_ψ} and the slope of the curve of lateral-force coefficient against angle of yaw C_{Y_ψ} was usually stabilizing, appreciable, and varied with angle of attack. The influence of the wing-fuselage interference on the vertical tail was also generally stabilizing and appreciable at negative and small positive angles of attack but varied with angle of

attack. With no vertical tail, increased fuselage length ordinarily caused a slight increase in C_{n_ψ} for the fuselage lengths tested. At the larger negative angles of attack, this effect was more pronounced. For the complete model, the increase in C_{n_ψ} was approximately linear with fuselage length. The magnitude of this increase appreciably diminished with a positive increase in angle of attack. The slopes C_{n_ψ} and C_{Y_ψ} increased approximately linearly with vertical-tail area. For the system of axes used, the slope of the curve of rolling-moment coefficient against angle of yaw C_{l_ψ} increased with vertical-tail area at negative and small positive angles of attack but the opposite was true at large positive angles of attack. The results also indicated that increased dihedral angle slightly decreased the rate of change of C_{n_ψ} with vertical-tail area but had a negligible effect on the rate of change of C_{n_ψ} with fuselage length. Except at large positive angles of attack, C_{Y_ψ} was generally greater with the smaller dihedral angle. A slight increase in C_{n_ψ} was caused by the end-plate effect of the horizontal tail on the vertical tail. NACA L-17.

PB 94286

Humphreys, Milton D.

Effects of compressibility and large angles of yaw on pressure indicated by a total-pressure tube. Apr 1945. 16p drawings, graphs Mi $1.75 Ph $2.50

The effects of compressibility and angle of yaw on the pressure measured by a round-nose and a flat-nose total-pressure tube have been investigated. The tests were conducted in the Langley rectangular high-speed tunnel at Mach numbers from 0.3 to 0.9 for angles of yaw from 0° to 180°. The results indicated that no error was incurred in the measurement of total pressure by either tube for angles of yaw from 0°to 10° in the Mach number range investigated. At constant Mach numbers, the round-nose tube had a linear variation of total-pressure error with angle of yaw at angles ranging from 50° to 70°. This characteristic is desirable in yaw heads of the Y-type. The flat-nose tube had a nonlinear variation of total-pressure error with angle of yaw in this range. NACA L-77.

PB 94421

Hunter, Paul A. and Reeder, John P.

Flight measurements to determine effect of a spring-loaded tab on longitudinal stability of an airplane. Feb 1946. 39p photos, drawing, graphs, tables Mi $2.25 Ph $5.00

In conjunction with a program of research on the general problem of stability of airplanes in the climbing condition, tests have been made of a spring-loaded tab, which is referred to as a "springy tab," installed on the elevator of a low-wing scout bomber. The tab was arranged to deflect upward with decrease in speed, which caused an increase in the pull force required to trim at low speeds and thereby increased the stick-free static longitudinal stability of the airplane. It was found that the springy tab would increase the stick-free stability in all flight conditions, would reduce the danger of inadvertent stalling because of the definite pull force required to stall the airplane with power on, would reduce the effect of center-of-gravity position on stick-free static stability, and would have little effect on the elevator stick forces in accelerated flight. Another advantage of the springy tab is that it might be used to provide almost any desired variation of elevator stick force with speed by adjusting the tab hinge-moment characteristics and the variation of spring moment with tab deflection. Unlike the bungee and the bobweight, the springy tab would provide stick-free static stability without requiring a pull force to hold the stick back while taxying. A device similar to the springy tab may be used on the rudder or ailerons to eliminate undesirable trim-force variations and speed. NACA L-210.

PB 94319

Johnson, Harold I.

Approximate determination of the power required to move control surfaces as related to control-booster design. Sep 1945. 16p graphs, table Mi $1.75 Ph $2.50

As a part of a general investigation of control boosters, preliminary calculations were made to indicate the sizes of control boosters necessary to move the controls of airplanes of various sizes. The analysis was based on the assumption that the controls were moved with a rapidity and amplitude equal to that measured with a fighter airplane in simulated combat. A corollary purpose consisted in determining the effect on reducing booster-power unit size of incorporating an energy accumulator in the booster system. The analysis indicates that up to 13 times as large a power unit would be required for supplying sudden bursts of power if no accumulated energy were available as compared to a power unit capable of supplying the average power used in continuous maneuvering in combination with a relatively small energy accumulator. Results of the calculations show that to operate all the controls of a small fighter-type airplane, a power source of 0.057 horsepower in combination with an accumulator capable of storing 51.4 foot-pounds of energy would be sufficiently large if friction and booster cycle losses are neglected. In this case, the accumulater would be required to supply bursts of power in amounts up to 0.462 horsepower for extremely short periods of operation. The power requirements and booster sizes increase rapidly with airplane size. Under the assumptions of the analysis, a power source of 2.05 horsepower in combination with an accumulator capable of storing 3350 foot-pounds of energy would be required to operate all the controls of a bomber weighing about 70,700 pounds. In this case, the peak-power demand required from the accumulator would approximate 20 horsepower. Some of

the problems involved in predicting the booster requirements are discussed in relation to the assumptions that were made in the preliminary evaluation. It is concluded that extensive flight tests are required to determine the effects of speed, size, and airplane functional type on the booster requirements. NACA L-102.

PB 94295

Johnson, Harold I.

Comparison of data obtained by two flight techniques for determining the sideslip characteristics of a fighter airplane. Aug 1945. 10p drawings, graphs Mi $1.25 Ph $1.25

In order to determine the validity of sideslip data obtained in flight by the continuous-record method, sideslip data obtained from a fighter airplane in slowly increasing sideslips have been compared with sideslip data obtained from the same airplane in sideslips in which all the flight conditions were stabilized. The results of the comparison showed no essential difference in the sideslip characteristics obtained by the two flight techniques even though the continuous sideslips were purposely executed with a yawing velocity about double the usual rate of 1° per second in order to accentuate the effects of the small yawing and rolling velocities inherent in the method. Approximate theoretical calculations confirmed the experimental results but indicated that rates of yawing or rolling lower than 1° per second are desirable if the continuous-sideslip technique is employed in testing airplanes much larger than current fighters. The method of measuring sideslip characteristics under steady conditions is preferred to the method of measuring sideslip characteristics in slowly increasing sideslips when the airplane is directionally unstable, when it has a large pitching moment due to sideslip, or when a poor relationship exists among the rudder, aileron, and elevator control forces in sideslips. NACA L-87.

PB 94444

Johnston, J. Ford and Voglewede, T. J.

Flight investigation of NACA D_8 cowlings on the XP-42 airplane. II. Low-inlet-velocity cowling with axial-flow fan and propeller cuffs. Jan 1943. 26p photos, drawings, graphs, tables Mi $2.00 Ph $3.75

The results are presented of a series of flight tests of the performance and cooling characteristics in high-speed level flight and in climb of the XP-42 airplane equipped with a short-nose low-inlet-velocity cowling and an axial-flow fan mounted on the spinner. This cowling is one of a series being tested in an effort to improve the performance and cooling characteristics of air-cooled engine installations. The results of the tests indicated a maximum speed of 330 miles per hour at 890 horsepower at 16,000 feet, which is above the engine critical altitude. Pressure measurements at the entrances to the cylinder baffles showed a uniform distribution of cooling-air pressures on the front of the engine in high-speed level flight and a fairly even distribution in climb. These front pressures averaged 87 percent of free-stream impact pressure in the high-speed condition, 99 percent in full-power climb at 155 miles per hour, and 105 percent in full-power climb at 140 miles per hour. Cylinder-head temperatures were well below their specified limit under all conditions, but maximum cylinder-base temperatures in the high-speed condition exceeded their specified limit when corrected to Army summer air. Cylinder-base temperatures in climb were marginal. When the cylinder baffling was made more nearly standard by removal of the special sealing strips at the bottom of the baffles on the cylinder barrels, maximum base-temperature indications were reduced 15° F. A reduction of this magnitude brings base temperatures below Army limits in all conditions. NACA L-243.

PB 94397

Jones, Robert T. and Greenberg, Harry

Effect of hinge-moment parameters on elevator stick forces in rapid maneuvers. Nov 1944. 27p graphs Mi $2.00 Ph $3.75

The importance of the stick force per unit normal acceleration as a criterion of longitudinal stability and the critical dependence of this gradient on elevator hinge-moment parameters have been shown in previous reports. The present report continues the investigation with special reference to transient effects for maneuvers of short duration. The analysis made showed that different combinations of elevator parameters which give the same stick force per unit acceleration in turns give widely different force variations during the entries into and recoveries from steady turns and during maneuvers of short duration such as abrupt pull-ups. A combination of relatively large negative values of the restoring tendency C_{h_δ} and the floating tendency $C_{h_{\alpha_t}}$, approaching those of an unbalanced elevator, results in a stick force that is high during the initial stage of a pull-up and then decreases, and may even reverse, as the acceleration is reduced at the end of the maneuver. The stick force per unit acceleration is greater for abrupt than for gradual control movements. If the negative value of C_{h_δ} is reduced so that the corresponding value of $C_{h_{\alpha_t}}$ becomes slightly positive, the reversal of force may be eliminated and the force may be brought nearly in phase with the acceleration. There is a limit to the permissible reduction of the value of C_{h_δ} however, because as C_{h_δ} approaches zero the stick force per unit acceleration may become lower for abrupt than for gradual maneuvers and may thus lead to undesirably low stick forces at the beginning of the maneuver. NACA L-185.

PB 94433

Jones, Robert T. and Wetmore, Joseph W.

Emergency measures for increasing the range of fighter airplanes. May 1943. 18p drawings, graphs Mi $1.75 Ph $2.50

An analysis was made to show the relative effectiveness of streamline external fuel tanks, a fuel tank in the form of a wing mounted in a biplane position, and auxiliary wing panels attached at the wing tips to increase the span as temporary means for increasing the range of a fighter-type airplane. The airplane considered is representative of either an Army or Navy single-engine heavy fighter. Figures and charts for the various devices considered show the results of calculations of range, duration of flight, and take-off distance for both land-base and carrier operation. The results indicated that the wing-tip extensions were the most promising of the devices considered. It was estimated that 10-foot tip extensions—that is, an increase in span of 20 feet—used in conjunction with a streamline external fuel tank would increase the range of the airplane 125 to 130 percent without any increase in the distance required to take off from either a land base or a carrier. With 5-foot tip extensions, the range would be increased 65 to 70 percent, under the same limitations. The tank wing was found to cause some reduction in the efficiency of the airplane in terms of miles per gallon. The added area would permit a greater fuel load to be carried, however, for a given take-off distance and the range would be thereby increased. For a given take-off distance form a land base, the calculated increase in range due to the tank wing was about 45 percent. The increase for a given carrier take-off would be about 20 percent. Increasing the range 50 percent by carrying extra fuel in a streamline external tank without any other modifications to the airplane would require an increase of 20 percent in take-off distance from a land base and 32 percent from a carrier. NACA L-223.

PB 94328

Jones, Robert T.

Method for studying the hunting oscillations of an airplane with a simple type of automatic control. May 1944. 16p drawings, graphs Mi $1.75 Ph $2.50

A method is presented for predicting the amplitude and frequency, under certain simplifying conditions, of the hunting oscillations of an automatically controlled aircraft with lag in the control system or in the response of the aircraft to the controls. If the steering device is actuated by a simple right-left type of signal, the series of alternating fixed-amplitude signals occurring during the hunting may ordinarily be represented by a square wave. Formulas are given expressing the response to such a variation of signal in terms of the response to a unit signal. A more complex type of hunting, which may involve cyclic repetition of signals of varying duration, has not been treated and requires further analysis. Several examples of application of the method are included and the results discussed. NACA L-112.

PB 94231

Kamm, Robert W.

Spin-tunnel tests of airplane models with extreme variations in mass distribution along the three body axes. Mar 1945. 33p photos, diagrs, drawings, tables Mi $2.25 Ph $5.00

An investigation was conducted in the Langley 15-foot and 20-foot free-spinning tunnels to determine the effect of extreme changes in mass distribution along each of the three body axes. Two models of single-engine airplanes having different geometric arrangements and aerodynamic characteristics were tested with a series of different loadings. The test results were analyzed to investigate the effects of the individual inertia moment parameters upon spin and recovery characteristics. The test results indicated that the value of the inertia yawing-moment parameter mainly determined the effect of aileron setting on recovery, that the values of the inertia yawing-moment and inertia rolling-moment parameters influenced the effect of elevator setting on recovery, and that the value of the inertia pitching-moment parameter determined the attitude of the spin at the normal spinning control configuration (ailerons neutral, elevators up, and rudder full with the spin) when mass was distributed chiefly along the wing. The inertia pitching-moment parameter also determined the angular velocities of the spins. Steady spins could not be maintained when all three moments of inertia were equal. NACA L-22.

PB 94306

Kayten, Gerald G. and Koven, William

Comparison of wind-tunnel and flight measurements of stability and control characteristics of a Douglas A-26 airplane. Mar 1946. 45 p photos, drawings, graphs, tables Mi $2.50 Ph $6.25

Stability and control characteristics determines from tests in the Langley 19-foot pressure tunnel of a 0.2375-scale model of the Douglas XA-26 airplane are compared with those measured in flight tests of a Douglas A-26B airplane. Agreement regarding static longitudinal stability as indicated by the elevator-fixed neutral points and by the variation of elevator deflection in both straight and turning flight was found to be good except at speeds approaching the stall. At these low speeds the airplane possessed noticeably improved stability, which was attributed to pronounced stalling at the root of the production wing. The pronounced root stalling did not occur on the smooth, well-faired model wing. Elevator tab effectiveness determined from model tests agreed well with flight-test tab effectiveness, but control-force variations with speed and acceleration were not in good agreement. Although some discrepancy was introduced by the absence of a seal on the model elevator and by small differences in the determination of elevator deflections, correlation in control-force characteristics was also influenced by the effects of fabric distortion at high speeds and by small construction dissimilarities

such as differences in trailing-edge angle. Except for the wave-off condition, in which the tunnel results indicated rudder-force reversal at a higher speed than the flight tests, agreement in both rudder-fixed and rudder-free static directional stability was good. Model and airplane indications of stick-fixed and stick-free dihedral effect were also in good agreement, although some difference in geometric dihedral may have existed because of wing bending in flight. The use of model hinge-moment data obtained at zero sideslip appeared to be satisfactory for the determination of aileron forces in sidslip. Fairly good correlation in aileron effectiveness and control forces was obtained; fabric distortion may have been responsible to some extent for higher flight values of aileron force at high speeds. Estimation of sideslip developed in an abrupt aileron roll was fair, but determination of the rudder deflection required to maintain zero sideslip in a rapid aileron roll was not entirely satisfactory. NACA L-99.

PB 94527

Keenan, Joseph H. and Neumann, Ernest P.

Measurements of friction coefficients in a pipe for subsonic and supersonic flow of air. Jul 1943. 34p drawings, graphs, tables Mi $2.25 Ph $5.00

Tests of the flow of air through brass tubes show that, for subsonic flow, the friction coefficient is the same function of Reynolds number as for incompressible flow but that, for supersonic flow, the apparent friction coefficient is less than for incompressible flow at the same value of the Reynolds number and decreases with increase in Mach number. The analytical relation between friction coefficient, tube length, and Mach number is shown for flow without shock and the conditions for flow with and without shock are delimited. The method of analysis is given. NACA W-44.

PB 94374

King, Douglas A. and Mas, Newton A.

Effects on low-speed spray characteristics of various modifications to a powered model of the Boeing XPBB-1 flying boat. Jun 1945. 20p photos, drawings, graphs, tables Mi $1.75 Ph $2.50

A 1/10 size powered model of the Boeing XPBB-1 flying boat, which was dynamically similar to the full-size flying boat, was tested in Langley tank no. 1 to observe the effects of trim and powered propellers, of lengths of forebody and afterbody, and of various spray strips upon the low-speed spray characteristics. The effects of powering the propellers were to lower the trim and to pick up spray that would not strike the propeller disks when the propellers were windmilling. Lowering the trim increased the height of the spray with respect to the hull. Changes in the length of forebody or afterbody that increased the ratio of forebody length to afterbody length raised the trim and reduced the intensity of spray in the propellers. Spray strips having the form of thin plates projecting vertically downward from the forebody chines were found to be very effective in preventing spray from striking the propellers. Fillets between the spray strips and the bottom of the hull markedly reduced the effectiveness of the spray strips. The unfilleted vertical spray strips were about as effective in controlling the spray as spray strips of the same length having an angle of down flare of 30° and extending out from the chine so as to increase the beam by almost 13 percent. NACA L-162.

PB 95560

King, Robert L.

XT-30 airplane mock-up inspection. Oct 1948. 2p Mi $1.25 Ph $1.25

1. Aircraft inspection
2. XT-30 (Airplane)

PB 94297

Kleckner, Harold F.

Preliminary flight research on an all-movable horizontal tail as a longitudinal control for flight at high Mach numbers. Mar 1945. 15p photos, graphs, drawings Mi $1.75 Ph $2.50

The NACA is conducting flight tests of an all-movable horizontal tail installed on a Curtiss XP-42 airplane because of its possible advantages as a longitudinal control for flight at high Mach numbers. The results are presented for some preliminary tests in the low-speed range for which the tail was very closely balanced aerodynamically and a bobweight was used to obtain stable stick-force variations with speed and acceleration. For these tests, the tail was hinged at 0.24 chord and was tired with two arrangements of servotab control. The elevator control was found to be unsatisfactory with the control arrangements tested. Although there were sufficient variation of stick force with acceleration in steady turns and a stable stick-force variation with speed, the near-zero variation of stick force with stick deflection resulted in an extremely sensitive control that required continuous attention in order to avoid motions of the airplane due to inadvertent movements of the control stick. For subsequent tests, the servotabs are being connected as geared unbalancing tabs in order that more conventional elevator hinge-moment characteristics may be obtained. The expected advantages of the all-movable tail with a control system utilizing tabs would of course be limited to flight at Mach numbers below those for which severe compressibility effects are encountered on the tail itself. For higher Mach numbers, the all-movable tail would require an irreversible power-boost control in order to handle the large hinge-moment increases that are expected. NACA L-89.

PB 94275

Kuhn, Paul and others.

Effect of concentrated loads on flexible rings in circular shells. Dec 1945. 60p drawings, graphs, tables Mi $2.75 Ph $7.50

The standard method of analyzing fuselage rings has been known for some time to be considerably in error when the rings are in large fuselages. In order to provide a basis for a more accurate analysis, strain measurements were made on a series of circular cylinders with reinforcing rings, subjected to concentrated loads, in which the bending stiffness of the rings was varied systematically over a wide range. The results are presented and compared with the results obtained by theoretical methods. A method proposed by N. J. Hoff for analyzing rings subjected to vertical loads, extended in the present paper to cover a basic cases, was found to give satisfactory agreement with the test results. A method proposed by Wignot, Combs, and Ensrud was found to be considerably in error when used in the originally published form. A modification of this method was developed with the relative stiffness parameter redefined, and the accuracy of the method, although less accurate than the method of Hoff, retains the advantage offered in the original method of Wignot, Combs, and Ensrud of greatly reducing the time of analysis through the use of graphs. NACA L-66.

PB 94211

Kuhn, Paul and Brilmyer, Harold G.

Stresses near the juncture of a closed and an open torsion box as influenced by bulkhead flexibility. Aug 1945. 33p drawings, graphs, tables Mi $2.25 Ph $5.00

A structure consisting of an open box joined to a closed box was subjected to torsional loading. Stress surveys were made first with a stiff bulkhead and then with a flexible one at the discontinuity. The results were compared with stresses calculated by a previously published theory, extended in this paper to take into account the flexibility of the bulkhead at the discontinuity. It was found that the stress distribution is not sensitive to bulkhead stiffness when this stiffness is large, and the experimental stresses agreed fairly well with the calculated stresses under such test conditions. When the bulkhead stiffness was small, however, the calculations became sensitive to errors in estimating this stiffness; such errors may be caused, for instance, by neglecting the effect of rivet deformation. The method of calculation is shown in detail for one case. NACA L-2.

PB 94438

Land, Norman S.

Effect of powered propellers on the aerodynamic characteristics and the porpoising stability of a dynamic model of a long-range flying boat. May 1943. 7p graphs Mi $1.25 Ph $1.25

The tests described in this report were made on a 1/8-full-size model of a large, long-range, twin-engine flying boat in NACA tank no. 1. The airplane had a wing loading of 43.9 pounds per square foot and a power loading of 11.5 pounds per horsepower. Its arrangement was such that 34.2 percent of the wing area and 56.1 percent of the horizontal tail area were included within the fore-and-aft projection of the propeller disks. The model was fitted with leading-edge slats to make the angle of attack for maximum lift coefficient correspond with that of the airplane at the low Reynolds number associated with the tank tests ($3.28\ 10^5$ based on the mean aerodynamic chord and the get-away speed of the model). The scale diameter and form, power for which was furnished by two variable-frequency alternating-current motors. Sufficient power was available to develop scale thrust with the propellers. The tests were divided into two parts: (1) aerodynamic tests to determine the effect of the slipstream and thrust from the powered propellers on the lift and trimming-moment characteristics, and (2) hydrodynamic tests to determine the effect of the powered propellers on the range of stable locations of the center of gravity. NACA L-235.

PB 94324

Lange, Roy H.

Summary of drag results from recent Langley full-scale-tunnel tests of army and navy airplanes. Feb 1945. 70p photos, drawings, tables Mi $3.00 Ph $8.75

The results of drag investigations of twelve military airplanes tested in the Langley full-scale tunnel for the purpose of increasing their speed are summarized in this report. The purpose of this report is to point out undesirable aerodynamic features as a guide to airplane designers. The drag data include results of tests to determine the effects of the cowling and cooling arrangements, the wing-surface irregularities, the leakage, the landing-gear installations, the canopies, the radio antennas, and the armament installations on the drag of the airplane. In order to simplify the presentation of the data, perspective drawings are used to show the original installations and modifications investigated. Included on each drawing is a discussion of the main results of the tests. The results of the tests indicate that the elimination of leakage and attention to detail design offer possibilities for considerably reducing the drag. NACA L-108.

PB 94515

Leary, W. A. and Taylor, E. S.

Significance of the time concept in engine detonation. Jan 1943. 70p photos, graphs, tables Mi $3.00 Ph $8.75

An experimental technique has been developed by means of which the variables affecting the time element in the detonation process in a spark-ignition engine can be controlled and approximately measured. It is shown that increasing the rate of compression of the unburned charge allows higher peak pressures to be used. The importance of the ignition delay is demonstrated by observing that pressure and temperature considerations are insufficient to describe completely the events leading to detonation. The effect of variation in the time element on the maximum permissible pressure, the

temperature, and the relative density of the last part of the charge to burn has been determined. Certain aspects of ignition delay and the mechanism of normal and detonating combustion are discussed on the basis of chain-reaction theory. Suggestions are offered for a more satisfactory basis of comparison for detonation data. A discussion of the precision of various methods of determining the pressure and temperature of the unburned charge is included. On the basis of information and experience gained in this investigation, a new and simplified experimental approach to the detonation problem is outlined. NACA W-32.

PB 94523

Lebenbaum, Paul

Altitude rating of electric apparatus. Jan 1943. 26p graphs, table Mi $2.00 Ph $3.75

This paper studies the effect of altitude on the ratings of rotating electric machines and, after determining the fundamental principles involved, discusses these in relation to the application of such machines in modern aircraft. It is shown that the rating of a self-ventilated, direct engine-driven aircraft generator decreases rapidly with altitude and, at some altitude within the operating range of the airplane, the generator may be able to dissipate only its noload losses. It is also shown that an air-scoop-ventilated, direct engine-driven aircraft generator maintains its rating over most of the operating range of present-day aircraft. Finally, certain sea-level tests are proposed from which calculations of rating under altitude conditions can be made. The theory and tests presented in this paper have been checked by altitude-chamber studies on an aircraft-type, direct-current generator. NACA W-40.

PB 94426

Liddell, Robert B.

Wind-tunnel investigation of control-surface characteristics. XIX. Double flap with an overhand and an internal aerodynamic balance. Jun 1944. 52p drawings, graphs, table Mi $2.75 Ph $7.50

Wind-tunnel tests have been made in two-dimensional flow to investigate the aerodynamic characteristics of a double flap with an internal and an overhang balance. Three sizes of each type of balance were tested with three relative rates of deflection of the two flaps. An NACA 66-009 airfoil having a 0.30-airfoil-chord straight-contour forward flap and a 0.20-airfoil-chord straight-contour rearward flap was used. The test results indicated that a balanced double flap produced the same lift as a single plain flap of the same chord and also produced highly balanced hinge moments. High lifts and low hinge moments were obtained with a double-flap arrangement if either an overhand or an internal balance having a chord 50 percent of the flap chord was incorporated on the forward flap. The overhang-balance flap showed a lower value of the hinge-moment gradient due to flap deflection than the internally balanced flap. NACA L-215.

PB 94460

Liddell, Robert B.

Wind-tunnel tests of spoilers on tail surfaces. Aug 1945. 100p drawings, graphs, tables Mi $4.25 Ph $12.50

Wind-tunnel tests have been made in two-dimensional and three-dimensional flow to investigate the aerodynamic characteristics of spoilers on tail surfaces for low-speed flight. The test results indicated that spoilers on tail surfaces showed little possibility of replacing conventional control surfaces. Spoilers might be used as auxiliary aids to conventional control surfaces if a number of the disadventages that they present can be remedied or tolerated. These disadvantages consisted principally of high drag, erratic action, and an adverse effect on normal control-surface hinge moments. A spoiler on the forward portion of the tail surface, used alone or in conjunction with the conventional control surface, gave unsatisfactory results because of its erratic effect throughout the angle-of-attack range. Spoilers generally should be located on the rear portion of the tail surface, but an auxiliary forward spoiler might be advantageous in depressing the tail in the landing maneuver. A forward auxiliary spoiler should be located on the opposite side of the tail surface from the rear spoiler, since two spoilers on the same side of the tail surface tend to cancel the effects obtained by the use of either spoiler alone. NACA L-260.

PB 94285

Lindsey, W. F.

Effect of compressibility on the pressures and forces acting on a modified NACA 65,3-019 airfoil having a 0.20-chord flap. Jan 1946. 81p photos, drawing, graphs, table Mi $3.75 Ph $11.25

An investigation has been conducted in the Langley rectangular high-speed tunnel to determine the effect of compressibility on the pressure distribution for a modified NACA 65,3-019 airfoil having a 0.20-chord flap. The investigation was made for an angle-of-attack range extending from -2° to 12° at flap deflections from 0° to -12°. Test data were obtained for Mach numbers from 0.28 to approximately 0.74. The results show that the effectiveness of the trailing-edge-type control surface rapidly decreased and approached zero as the Mach number increased above the critical value. NACA L-76.

PB 94284

Lindsey, W. F.

Effect of Mach number on position error as applied to a pitot-static tube located 0.55 chord ahead of an airplane wing. May 1944. 10p photos, drawing, graph Mi $1.25 Ph $1.25

The effect on static-pressure measurements of locating a pitot-static tube 0.55 chord ahead of an

airfoil section has been investigated. The tests were conducted in the NACA 24-inch high-speed tunnel on airfoil sections of various thickness ratios over a large range of Mach number. The results show that for a wing having a thickness ratio of 0.15 the measured Mach number, determined from a pitot-static-tube reading, is approximately 0.01 too low at a stream Mach number of 0.4 and approximately 0.03 too low at a Mach number of 0.8. NACA L-75.

PB 94524

Locke, Fred W. S.

Correlation of the dimensions, proportions, and loading of existing seaplane floats and flying-boat hulls. Mar 1943. 20p graphs, tables Mi $1.75 Ph $2.50

1. Seaplanes—Design
2. NACA W-41

PB 94540

Locke, F. W. S. and Hugli, W. C.

Method for studying the longitudinal dynamic stability of flying-boat-hull models at high planing speeds and during landing. Apr 1945. 38p photos, drawings, graphs, tables Mi $2.25 Ph $5.00

The investigation which forms the subject of this report originated with the concept that the various types of instability sometimes encountered in the motion of a flying boat on the water at high speeds and high trim angles, particularly upper-limit porpoising and skipping, might have the same basic source and therefore be susceptible of investigation by some test procedures. A method is described for carrying out generalized experimental studies of the longitudinal dynamic stability of flying-boat-hull models. Predetermined disturbances of the motion at constant speed are introduced at an initial instant of time, simulating disturbances which might occur in actual landing or take-off maneuvers, and the effects on the subsequent motion are recorded graphically. Direct comparisons between different models, on a quantitative basis, are thus provided for. Data on three related models are presented, which cover wide variations of initial disturbances within a limited range of equilibrium conditions of motion. Although not extensive enough to justify sweeping conclusions, these data show: 1. That initial disturbances will bring out unstable characteristics in a model, within regions consistent in extent with those defined in special tests for particular characteristics such as the "upper limit, decreasing trim". 2. That the magnitudes of the initial disturbances are more important in this connection than their character, even when their character is so altered that in one case the model is deeper in the water at the initial instant of time, while in another case it is clear out of the water—so that it must then land. 3. That, within bounds, increasing the magnitudes of the disturbances tends to cause progressively wider trim ranges of instability in a given model. Beyond certain more or less well defined bounds, however, increasing the magnitudes of the disturbances seems to have almost no effect. It is concluded that the method could be used, if desired, for the study of normal service landings as such, though no particular effort to do this was made in the present instance. The main thesis, that upper-limit porpoising and skipping have the same basic source, is not definitely proved. The work is believed, however, to contribute to the growing body of circumstantial evidence in support of it, and there does not appear to be pressing need for attempting a rigorous proof at this time. The matter is though to have been reduced from practical to academic importance. NACA W-57.

PB 94541

Locke, F. W. S. and Barklie, Jean A.

Tank tests on the resistance and porpoising characteristics of three flying-boat hull models equipped with planing flaps. Nov 1944. 50p drawings, graphs Mi $2.50 Ph $6.25

This report presents the results of exploratory model experiments on the resistance and porpoising characteristics of flying-boat hulls equipped with retractable planing flaps. The experiments were made in the course of an investigation which had the twofold objective of developing a flap-hull combination which would have: 1. With the flap extended, hump-resistance characteristics at least equal to those of the selected reference ship, the XPB2M-1 flying boat. 2. With the flap retracted, much better upper-limit porpoising characteristics at planing speeds. Both of the above objectives have been realized with a planing flap attached to the afterbody, about two beams abaft the main step of hulls which have high upper limits of stability with no flap. Three combinations of hull and afterbody flap, together with possible operating procedures, are suggested as having practical possibilities. These are discussed on pages 11 to 15. With the first two combinations, the hump resistance is about equal to the corresponding value for the XPB2M-1 flying boat, and the peak of the curve of lower limits of stability is lower. By retracting the flap as soon as planing is established, upper-limit porpoising is eliminated. The above advantages of planing flaps when attached to the afterbody were not obtained when the planing flaps were attached to the forebody. Forebody flaps were found to have harmful effects on the hump resistance. They lowered to a very appreciable extent the lower limit of stability at moderate and high planing speeds, but had little effect on the position of either the peak of the lower-limit curve, or the upper-limit curve. NACA W-58.

PB 94257

Loftin, Laurence K., Jr.

Effects of specific types of surface roughness on boundary-layer transition. Feb 1946. 43p photos, diagrs, graphs, tables M Mi $2.50 Ph $6.25

Tests were conducted with two typical low-drag airfoils of 90-inch chord to determine the effects of

surface projections, grooves, and sanding scratches on boundary-layer transition. The Reynolds number at which a spanwise row of cylindrical projections would cause premature transition was determined for a range of Reynolds number from approximately 3×10^6 to 10×10^6. Data were obtained for projections of various sizes and chordwise locations on both low-drag airfoils. The results were analyzed on the assumption that the critical airfoil Reynolds number for a given projection was a function only of the local-flow conditions around the projection. This assumption neglected possible effects of tunnel turbulence, pressure gradient, boundary-layer Reynolds number, and the original extent of the laminar flow. The data correlated on the basis of this assumption within a range of critical airfoil Reynolds number of $\pm 0.5 \times 10^6$ and within a range of projection height of $\pm$ 0.002 inch. The tests of surface grooves and sanding scratches indicated that, for the range of Reynolds number investigated the laminar boundary layer was much less sensitive to surface grooves and sanding scratches than to projections above the surface. NACA L-48.

PB 94381

Lowry, John G.

Resume of hinge-moment data for unshielded horn-balanced control surfaces. Jun 1943. 13p diagrs, graphs Mi $1.75 Ph $2.50

The available hinge-moment data for unshielded horn-balanced control surfaces have been summarized herein. An attempt has been made to present the data in a form that may be of some assistance in the preliminary design of horn-balanced controls. The data indicate that an increase in stick-free stability can be obtained with a horn balance, but care must be taken to eliminate the undesirable heaviness of control forces that accompanies this increase in stick-free stability. NACA L-169.

PB 94465

Luoma, Arvo A.

Effect of compressibility on pressure distribution over an airfoil with slotted frise aileron. Jul 1944. 67p drawings, graphs, tables Mi $3.00 Ph $8.75

Complete pressure-distribution measurements were made over an airfoil with a slotted Frise aileron for Mach numbers from 0.25 to approximately 0.76 for various airfoil angles of attack and aileron deflections. Section characteristics were determined from these pressure data. The tests showed a loss in aileron rolling power for aileron deflections from -12° to -19°. At high diving speeds, a decrease in the rate of roll can be expected because of a loss in aileron effectiveness $\Delta\alpha/\Delta\delta_a$ at these speeds. High stick forces for non-differential aileron deflections at high speeds were indicated; and, owing to a tendency of the upgoing aileron to overbalance, serious control difficulties at high diving speeds may be expected. As a result of the present data, the Air Force specifications for the calculation of aileron loads have been revised to take into account the actual loads at high speeds as shown by these data. NACA L-266.

PB 94263

McKinney, Marion O., Jr.

Experimental determination of the effect of negative dihedral on lateral stability and control characteristics at high lift coefficients. Jan 1946. 24p photos, drawings, graphs, tables Mi $2.00 Ph $3.75

The effects of negative dihedral on lateral stability and control characteristics at high lift coefficients have been determined by flight tests of a model in the Langley free-flight tunnel. The geometric dihedral angle of the model wing was varied from 0° to -20° and the vertical-tail area, from 0 to 35 percent of the wing area. The model was flown with various combinations of dihedral angle and vertical-tail area at lift coefficients of 1.0, 1.4, and 1.8. As the effective dihedral was decreased from 0° to -15°, the model became increasingly difficult to fly. With an effective dihedral of -15° the flying characteristics were considered to be dangerous because, when there was only a slight lag in the application of corrective control following a disturbance, the unstable moments resulting from spiral instability became sufficiently large to overpower the moments of the controls so that return to straight flight was impossible. Inasmuch as full-scale airplanes because of their greater size will diverge at a slower rate than free-flight models, the amount of negative effective dihedral that would constitute a dangerous condition is expected to be greater for full-scale airplanes. Increasing the directional stability reduced the magnitude of the sideslip and improved the general flight behavior. In the negative effective-dihedral range, increasing the lift coefficient from 1.0 to 1.8 had a slightly detrimental effect on the general flight behavior of the model at any given value of effective dihedral and directional stability. NACA L-54.

PB 94396

McKinney, Marion O., Jr. and Maggin, Bernard

Experimental verification of the rudder-free stability theory for an airplane model equipped with rudders having negative floating tendency and negligible friction. Nov 1944. 46p photo, drawing, graphs, tables Mi $2.50 Ph $6.25

An investigation has been made in the Langley free-flight tunnel to obtain an experimental verification of the theoretical rudder-free stability characteristics of an airplane model equipped with conventional rudders having negative floating tendencies and negligible friction. The model used in the tests was equipped with a conventional single vertical tail having rudder area 40 percent of the vertical tail area. The model was tested both in free flight and mounted on a strut that allowed freedom only in yaw. Measurements were made of the

rudder-free oscillations following a disturbance in yaw. Tests were made with three different amounts of rudder aerodynamic balance and with various values of mass, moment of inertia, and center-of-gravity location of the rudder. Most of the stability derivatives required for the theoretical calculations were determined from force and free-oscillation tests of the particular model tested. The theoretical analysis showed that the rudder-free motions of an airplane consist largely of two oscillatory modes—a long-period oscillation somewhat similar to the normal rudder-fixed oscillation and a short-period oscillation introduced only when the rudder is set free. It was found possible in the tests to create lateral instability of the rudder-free short-period mode by large values of rudder mass parameters even though the rudder-fixed condition was highly stable. The results of the tests and calculations indicated that, for most present-day airplanes having rudders of negative floating tendency, the rudder-free stability characteristics may be examined by simply considering the dynamic lateral stability using the value of the directional-stability parameter C_n for the rudder-free condition in the conventional controls-fixed lateral-stability equations. For very large airplanes having relatively high values of the rudder mass parameters with respect to the rudder aerodynamic parameters, however, analysis of the rudder-free stability should be made with the complete equations of motion. Good agreement between calculated and measured rudder-free stability characteristics was obtained by use of the general rudder-free stability theory, in which four degrees of lateral freedom are considered. When the assumption is made that the rolling motions alone or the lateral the rolling motions may be neglected in the calculations of rudder-free stability, it is possible to predict satisfactorily the characteristics of the long-period (Dutch roll type) rudder-free oscillation for airplanes only when the effective-dihedral angle is small. With these simplifying assumptions, however, satisfactory prediction of the short-period oscillation may be obtained for any dihedral. Further simplification of the theory based on the assumption that the rudder moment of inertia might be disregarded was found to be invalid because this assumption made it impossible to calculate the characteristics of the short-period oscillations. NACA L-184.

PB 94389

Mandel, Merven W. and Bartone, Leonard M.

Tensile tests of NACA and conventional machine-counter-sunk flush rivets. Oct 1944. 20p photos, drawings, graphs, tables Mi $1.75 Ph $2.50

An investigation was conducted to determine and compare the tensile strength of NACA and conventional machine-countersunk flush rivets of several rivet-head angles and varying counter-sunk depth. The results of the investigation are presented in the form of curves that show the variation of the tensile strength of the rivet with the ratio of the sheet thickness to the rivet diameter. NACA L-176.

PB 94536

Maney, G. A. and Wyly, L. T.

Impact properties of different temperatures of flush-riveted joints for aircraft manufactured by various riveting methods. Sep 1945. 37p photos, drawings, graphs, tables Mi $2.25 Ph $5.00

The results of an investigation to determine the impact properties of flush-riveted joints manufactured by different riveting methods are presented. Tests were made on a pendulum impact machine at temperatures of 70°, -50°, and -70° F. The rivets were made of aluminum alloy A17S-T and the plates, of aluminum alloy 24S-T. Preliminary tests of 70° F on specimens having varying ratios of rivet diameter to plate thickness were made under both static and dynamic loads. Supplementary torsion impact tests at 70° and at -70° F were made on specimens of 17S-T aluminum alloy obtained commercially. A metallographic study and some photomicrographs of the metal are included. The results of the tests showed the joints to be stronger under impact loads at temperatures varying from -50° to -70° F than at 70° F. No appreciable difference was found in the impact strength from -55° to 70° F. Torsion impact tests on commercially obtained specimens of aluminum alloy 17S-T showed about 10-percent increase in shear strength at temperatures of -70° F as compared with that obtained at 70° F. Commercial countersunk rivets with the head 0.003 inch below the surface before driving produced the strongest joints under impact energy to rupture with the area under the static load-deformation curve made in some preliminary tests showed remarkably consistent and fairly close agreement. There is a complete lack of correlation between the static strength of the joints and their capacity to absorb energy. The use of larger rivets in a given plate increases the energy absorption for the reason that the stronger rivets cause the plates to absorb energy by local buckling and distortion before the rivets shear. This property appears to be of considerable significance and worthy of a more detailed investigation. NACA W-53.

PB 94506

Martinelli, R. C. and others.

Investigation of aircraft heaters. I. Elementary tary heat transfer considerations in an airplane. Oct 1942. 70p drawings, graphs, tables Mi $3.00 Ph $8.75

1. Airplanes—Heaters
2. Heat—Transference
3. NACA W-23

PB 94494

Martinelli, R. C. and others.

Investigation of aircraft heaters. IV. Measured and predicted performance of longitudinally finned tubes. Oct 1942. 52p Mi $2.75 Ph $7.50

1. Airplanes—Heaters 2. Tubes, Heat exchanger 3. NACA W-12

PB 94495

Martinelli, R. C. and others.

Investigation of aircraft heaters. VII. Thermal radiation from athermanous exhaust gages. Dec 1942. 9p graphs Mi $1.25 Ph $1.25

Equations and necessary data for the calculation of the gaseous radiation from water vapor and carbon dioxide in an exhaust gas heat exchanger are presented. A typical calculation is included. NACA W-13.

PB 94496

Martinelli, R. C. and others.

Investigation of aircraft heaters. VIII. Simplified method for the calculation of the unit thermal conductance over wings. Mar 1943. 26p graphs Mi $2.00 Ph $3.75

A simplified approximate method of calculating the unit thermal conductance along an airfoil as a function of distance from the leading edge, by use of heat transfer data for smooth cylinders and smooth flat plates, is presented. Heat transfer rates experimentally obtained by several investigators on models of airfoils of sections R.A.F. 26, R.A.F. 30, Clark Y, and NACA M-6 are compared with results predicted by the use of this method. Calculations of the heat transfer rates to be expected from a typical full-scale wing are also given. NACA W-14.

PB 94405

Matheny, Cloyce E.

Comparison between calculated and measured loads on wing and horizontal tail in pull-up maneuvers. Oct 1945. 25p Mi $2.00 Ph $3.75

Comparisons have been made of measured and calculated loads on the wing and the horizontal tail in pull-up maneuvers for six airplanes ranging in weight from 4,700 to 48,000 pounds. The calculated loads were based on the control motions measured in flight. The aerodynamic characteristics of the airplanes required for the calculations were either obtained directly from wind-tunnel data or computed. Good agreement was obtained between calculated and measured loads for a specified elevator deflection when reliable wind-tunnel data were available and when the airplane maneuvers were consistent with the assumptions. The fact that only fair agreement was obtained in some of the cases was attributed either to poor quantitative knowledge of the aerodynamic parameters or to the violation of the assumptions on which the method is based. NACA L-193.

PB 94329

Mutterperl, William

Conformal transformation of an airfoil into a straight line and its application to the inverse problem of airfoil theory. Dec 1944. 75p drawings, graphs, tables Mi $3.50 Ph $10.00

A method of conformal transformation is developed that maps an airfoil into a straight line, the line being chosen as the extended chord line of the airfoil. The mapping is accomplished by operating directly with the airfoil ordinates. The absence of any preliminary transformation is found to shorten the work substantially over that of previous methods. Use is made of the superposition of solutions to obtain a rigorous counterpart of the approximate methods of thin-airfoil theory. The method is applied to the solution of the direct and inverse problems for arbitrary airfoils and pressure distributions. Numerical examples are given. Applications to more general types of regions, in particular to biplanes and to cascades of airfoils, are indicated. NACA L-113.

PB 94418

Mathews, Charles W. and Wood, Clotaire

Locus of possible positions of a heavy bomber in space after a 12-second time interval. Jun 1943. 17p graphs Mi $1.75 Ph $2.50

I. Airplanes—Flight paths 2. NACA L-206

PB 94279

Mayo, Wilbur L.

Theoretical and experimental dynamic loads for a prismatic float having an angle of dead rise of 22 1/2°. Jul 1945. 15p drawing, graphs, table Mi $1.75 Ph $2.50

An application of a modified hydrodynamic impact theory is presented. Plots are given from which the maximum load, and the variation of load with time may be obtained for a prismatic float of 22 1/2° angle of dead rise for different combinations of flight-path angle, trim, weight, velocity, and fluid density. The curves cover the range of trim, flight-path angle, and weight-velocity relationship for conventional airplanes. Test data obtained in the Langley impact basin are presented and are used to establish the validity of the theoretical curves. NACA L-70.

PB 92944

Mitchell, K.

On fundamental sets of solutions of the equations of lateral motion, and the rapid calculation of general solutions. May 1945. 30p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, New York $1.60

The lateral motion of a symmetrical aeroplane slightly disturbed from steady flight is determined, to the first order of small quantities, by the solution of a system of six simultaneous linear differential equations with constant coefficients, in which the inhomogeneous terms, representing control forces or the effects of gusts, may be arbitrary functions of time. In virtue of the general properties of such equations, as is well known, their most general solution can always be written down in a form involving definite integrals. Calculations of such theoretical expressions can be very tedious, and it is now shown that the most general solution can be much more simply obtained, by processes of addition, multiplication, and integration, from a set of three fundamental solutions. A large number

of such sets of fundamental solutions has already been obtained by means of the differential analyser, and the application to these of the methods of this report will make possible a large range of more special response calculations, some of which may well develop into important matters of routine. After an introductory statement of the equations of motion, the three fundamental solutions are defined in sect. 3.1, with four further solutions which are conveniently regarded as fundamental, though they can be derived from the original three. Relations between these seven solutions are given in sects. 3.2 to 3.6. Sect. 4 is concerned with the derivation of other solutions corresponding to constant or piecewise constant disturbances, and generalisation to disturbances given as any functions of time is made in sect. 5. A few particular examples of the technique developed are given in sect. 6, the fundamental solutions used being chosen from the differential analyser results mentioned above. A brief account of the scope of these is given in an Appendix, which includes in tabular form an index to the complete series of 1188 figures in which the results are contained. ARC RM 2182.

PB 89448

Moskatov, K. A.

Airplane landings on ice. Leningrad. Publishing house of the Chief administration of the northern sea route, 1938. Transactions of the Arctic research institute, V. 110: Studies on the properties of ice, part 1, art 5. 1938. 14p graph, tables Mi $1.75 Ph $3.75

I. Airplanes—Landing—Russia

PB 94274

Murray, Harry E. and Gillis, Clarence L.

Automatically variable control linkage and its effect on the lateral-control characteristics of a high-speed fighter airplane. May 1944. 17p drawings, graphs, table Mi $1.75 Ph $2.50

An analysis and a preliminary design were made for a control linkage that varies automatically with dynamic pressure. This device can provide greater lateral control than a fixed control linkage at all but one airspeed without additional aerodynamic balance. The mechanical construction should present to unusual problems and both the weight and volume of the device appear sufficiently small for use in single-seat fighter airplanes as well as in large machines. NACA L-65.

PB 94386

Murray, Harry E. and Erwin, Mary A.

Hinge moments of sealed-internal-balance arrangements for control surfaces. I. Theoretical investigation. Aut 1945. 40p drawings, graphs, table Mi $2.25 Ph $5.00

The results of a theoretical analysis of the hinge-moment characteristics of various sealed-internal-balance arrangements for control surfaces are presented. The analysis considered overhangs sealed to various types of wing structure by flexible seals spanning gaps of various widths or sealed to the wings structure by a flexible system of linked plates. Leakage was not considered; the seal was assumed to extend the full spanwise length of the control surface. The effect of the developed width of the flexible seal and of the geometry of the structure to which the seal was anchored was investigated, as well as the effect of the gap width that is sealed. The results of the investigation indicated that the most nearly linear control-surface hinge-moment characteristics can probably be obtained from a flexible seal over a narrow gap (about 0.1 of the overhang chord), which is so installed that the motion of the seal is restricted to a region behind the point of attachment of the seal to the wing structure. Control-surface hinge moments that tend to be high at large deflections and low or overbalanced at small deflections will result if a very narrow seal is used. NACA L-174.

PB 94289

Nutterperl, William

Solution of the direct and inverse potential problems for arbitrary cascades of airfoils. Dec 1944. 50p drawings, graphs, tables Mi $2.50 Ph $6.25

Solutions of the direct potential problem for a cascade—namely, to find the potential flow past an arbitrary cascade of airfoils—and of the inverse problem—namely, to find an airfoil having a prescribed velocity distribution in cascade—are presented. The methods used represent the extension to cascades of the Cartesian mapping function method of conformal transformation. NUmerical examples of the direct and inverse methods are given. The numerical labor required is conservatively estimated as double that involved for isolated airfoils by the corresponding methods. NACA L-81.

PB 94349

Naiman, Irven

Numerical evaluation of the e-integral occurring in the Theodorsen arbitrary airfoil potential theory. Apr 1944. 12p tables Mi $1.75 Ph $2.50

A more precise method of evaluating the E-integral occurring in the arbitrary airfoil theory of Theodorsen (NACA Reps. Nos. 411 and 452) is developed by retaining higher order terms in the Taylor expansion and by use of Simpson's rule. Formulas are given for routine calculation of the E-integral and for the necessary computational coefficients. The computational coefficients are tabulated for a 40-point division of the range of integration from 0 to 2π. With no increase in computational work the systematic error is the numerical value of E is reduced from the order of 1 percent to approximately 0.1 percent. NACA L-136.

—82133

PB 94291

Neely, R. h. and others.

Comparison of yaw characteristics of a single-engine airplane model with single-rotating and dual-rotating propellers. Apr 1944. 58p photos, drawings, graphs, tables Mi $2.75 Ph $7.50

Tests were made in the NACA 19-foot pressure tunnel to determine the yaw characteristics of a 0.32-scale model of a single-engine, fighter-type airplane with six-blade single-rotating and dual-rotating propellers. The propellers used in the investigation were of the same solidity and plan form. Force and moment characteristics of the model, with the exception of the rolling-moment characteristics, are presented for several model and power conditions. Curves are given that show estimated rudder-control characteristics of the design airplane in steady sideslips. The most important difference in the yaw characteristics of the airplane model with single-rotating and dual-rotating propellers was that, in the low-speed high-thrust conditions, large rudder deflections and forces were required to trim at zero yaw with single rotation, and negligible deflections and forces were required to trim at zero yaw with dual rotation. For the high-thrust conditions with the rudder fixed, the model with single-rotating propellers tended to be directionally unstable at large negative angles of yaw; whereas, with dual-rotating propellers the model was stable throughout the trim range. For moderate angles of yaw, a greater degree of rudder-fixed stability was generally obtained with single rotation than with dual rotation. The total range of angle of yaw maintained by maximum deflection of the rudder was greater with dual rotation. The rudder-control forces per degree of yaw were two to three times as great for single rotation as for dual rotation in the high-thrust conditions. NACA L-83.

PB 94330

Neely, Robert H. and others.

Effects of wing and nacelle modifications on drag and wake characteristics of a bomber-type airplane model. Dec 1945. 98p photos, drawings, tables Mi $4.25 Ph $12.50

An investigation of a model of a large four-engine bomber was conducted in the Langley 19-foot pressure tunnel to determine the effects of several wing and nacelle modifications on drag characteristics and air-flow characteristics at the tail. Leading-edge gloves, trailing-edge extensions, and modified nacelle afterbodies were tested individually and in combination. The effects of the various modifications were determined by force tests, tuft observations, and turbulence surveys in the region of the tail. Tests were made with fixed and natural transition on the wing and with propellers operating and propellers off. Most of the tests were conducted at a Reynolds number of approximately 2.6×10^6. The results indicated that application of certain of the modifications provided worth-while improvements in the characteristics of the model. The flow over the wing and flaps was improved, the drag was reduced, and the turbulence in the region of the tail was reduced. Trailing-edge extensions were the most effective individual modification in improving the flow over the wing with wing flaps neutral, cowl and inter-cooler flaps closed. Modified nacelle afterbodies were the most effective individual modification in reducing drag with either fixed or natural transition on the wing; however, trailing-edge extensions were slightly more effective with fixed transition. Combinations of either leading- or trailing-edge extensions and modified afterbodies were more effective than either modification alone. With cowl and intercooler flaps open, trailing-edge extensions with modified afterbodies provided substantial improvement in flow and drag characteristics. With wing flaps deflected, enclosing the flap behind the inboard nacelle within an extended afterbody or cutting the flaps at the nacelle appeared to be the most promising methods of improving the flow over the flaps and the tail. Although the results of hot-wire-anemometer surveys were not conclusive in regard to buffeting characteristics, the modifications did reduce the turbulence at the tail with wing flaps both neutral and deflected. The modifications, as a rule, were favorable to maximum lift. Appreciable reductions in longitudinal stability of the model were caused by addition of leading-edge gloves and trailing-edge extensions. NACA L-114.

PB 94380

Neihouse, A. I.

Mass-distribution criterion for predicting the effect of control manipulation on the recovery from a spin. Aug 1942. 14p graphs, table Mi $1.75 Ph $2.50

Results of spin-tunnel tests of 65 models indicated that when the airplane design simulated that of the earlier single-engine type, with mass distributed chiefly along the fuselage, aileron-with and elevator-up settings aided recovery, and the rudder was the predominant control for recovery. When the design approached the design of multiengine airplanes (or the more recent single-engine airplanes with wing tanks and wing armament) with the mass distributed chiefly along the wings, however, aileron-against and elevator down settings were conducive to the most rapid recovery and the elevator was the predominant control. The primary importance of the mass distribution of an airplane in determining its spinning characteristics is demonstrated and a useful criterion for predicting the optimum control manipulation for recovery, based on a nondimensional mass-distribution parameter, is presented. Charts that should be useful for such predictions to both the pilot and the designer are included. NACA L-168.

PB 94331

Nelson, W. J. and others.

Full-scale wind-tunnel investigation of forward underslung cooling-air ducts. Oct 1944. 50p

photos, drawings, graphs, tables Mi $2.50 Ph $6.25

A general investigation of underslung cooling-air ducts in various locations on a model of a typical single-engine tractor airplane has been conducted in the NACA full-scale tunnel. This report contains the results of tests of two forward underslung ducts. These tests were made to determine the effect of the inlet-velocity ratio, the angle of attack, the radiator resistance, and the propeller operation on the pressure recovery at the radiator, on the drag of the cooling installation, and on the critical speed of the ducts. Pressure measurements were made at the duct inlets and at the face of the radiator to determine the diffuser losses, and at the duct outlets to find the volume rate of air flow through the duct. The drag of the various duct installations was obtained from force tests of the model with the ducts installed and removed. Static-pressure distributions were taken at the duct lips and at the duct-fuselage fillets to determine the critical speed of the ducts. At low values of lift coefficient, with the propeller removed, pressure recoveries greater than 90 percent of the free-stream dynamic pressure were obtained at values of inlet-velocity ratio from 0.40 to 0.75. Propeller operation increased the pressure recovery 7 percent of the free-stream dynamic pressure at a thrust coefficient of 0.02 and about 45 percent of the free-stream dynamic pressure at a thrust coefficient of 0.11. Reductions in the outlet static pressure as large as 50 percent of the free-stream dynamic pressure were obtained by the installation of 45° exit flaps with the propeller removed, and even greater reductions were noted with the propeller operating. The lowest critical speed was measured at the left duct-fuselage fillet with the propeller operating. NACA L-115.

PB 81590

Neumark, S.

Disturbed longitudinal motion of an uncontrolled aircraft and of an aircraft with automatic control. Jan 1943. 54p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $3.00

A review of the theory of longitudinal stability is followed by an analysis of the effects of various types of automatic control. A large increase in phugoid damping is shown to be possible when the elevator is controlled either by the change in attitude (θ) or by variations in forward speed and acceleration (u & $\dot{u}$). The latter method is very effective on a stable aircraft but may not be satisfactory on an unstable one. An investigation of the motion following a disturbance shows that, with a u & $\dot{u}$ control, a sudden change in wind velocity is followed by a rapid change in attitude before the motion is damped out. This probably explains the unsatisfactory behaviour of the Wellington in rough weather with this type of control. This effect is less marked with the θ control. ARC RM 2078.

PB 94448

Nissen, J. M. and White, M. D.

Flight investigation of wing-gun fairings on a fighter type airplane. Oct 1941. 18p photos, drawing, tables Mi $1.75 Ph $2.50

Flight tests were conducted on a Navy fighter airplane to determine methods for fairing the wing-gun installation so as to retain the maximum lift of the clean wing insofar as possible. The unfaired-gun installation increased the stalling speed over that of the clean wing by approximately 5 knots with flaps down, power off and by approximately 3 knots with flaps down, power on. Two arrangements of fairings were developed that restored the lift of the wing. One arrangement consisted of engine cowl-type fairings for both projecting and submerged guns. This arrangement provided an annular opening between the gun barrel and the fairing lip for cooling the guns. The flush arrangement consisted of the engine cowl-type fairings for the projecting guns and faired wing openings for the submerged guns. Successful operation of this latter type of fairing, however, required that no air be admitted around the submerged guns. All arrangements of fairings as well as the unfaired guns improved the stalling characteristics of the airplane as compared with the clean-wing condition. It also appeared that the gun-fairing arrangements eliminated the ground-looping tendencies of the airplane that were attributed to wing stalling. This was evidenced by a series of landings made with the wing guns faired and the small tail wheel installed in which no ground-looping tendencies were noted. On the basis of data from the full-scale wind tunnel, it appears that no reduction in top speed need be anticipated with the four projecting fairings ventilated for cooling as compared with the unfaired gun condition. With the combination of projecting fairings and faired wing openings with no air admitted, the top speed may actually be increased 3 miles per hour as compared with the unfaired gun condition. NACA L-247.

PB 94316

Owen, J. B. B.

Strength considerations arising from the use of elevator "Trimming" tabs. Aug 1939. 22p graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, New York $1.30

This report briefly reviews strength considerations which arise from the use of elevator trimming tabs for trimming and maneuvering an aeroplane. Indirect control through a tab may be much more powerful than direct control by pilot's manual effort, especially at high speeds. At one time the use of trimming tabs for maneuvering purposes was prohibited; but, if the rate of operation of the tab is slow, no special strength problems appear to arise in an aeroplane, which is stable, stick free. For such an aeroplane approximate methods are given for estimating a rate of operating the tab, which will keep the maneuvering tail-load small, and for obtaining the

magnitude and chordwise distribution of load on a tailplane. (The underlying analysis is included in appendices to the report.) This slow rate of tab operation may not be satisfactory, however, for counteracting sudden changes of trim. The wing and tail loads which arise in the maneuvers of an aircraft which is appreciably unstable, when the stick is free, are indeterminate and will depend more on the skill of the pilot than if the aircraft were stable. For this reason stability seems desirable on grounds of safety. ARC RM 2245.

PB 94470

Parkinson, John B.

Design of the optimum hull for a large long-range flying boat. Sep 1944. 40p drawings, graphs, tables Mi $2.25 Ph $5.00

Principles for designing the optimum hull for a large long-range flying boat are proposed to suit the requirements of minimum drag, seaworthiness, and ability to take off and land at all operational gross weights. The principles include the use of moderate gross-load coefficients, ample forebody lengths, and deep steps and the close adherence of the form to that of a streamline body of revolution with a moderate fineness ratio. The validity of the design principles is illustrated by the results of tests in NACA tank No. 1 and in the NACA two-dimensional low-turbulence pressure tunnel of the form of the hull for a 400,000-pound transport flying boat. These results indicate that for large airplanes satisfactory hydrodynamic characteristics can be attained without an undue penalty in flight performance caused by the drag of the step and the chines. The effect of size on the proportions and the take-off performance of long-range flying boats is shown for three hypothetical flying boats having gross weights of 120,000, 300,000, and 480,000 pounds and the same wing loading, power loading, and hull loading. When these loadings are held constant, the size of the hull relative to the wing and take-off time and distance are decreased as the gross weight is increased. The hull of the flying boat, aside from its inherent ability to take off and land at sea, provides an immediate solution for the landing-gear problem of large long-range airplanes. NACA L-282.

PB 94224

Paulson, John W. and Bennett, Charles V.

Stability and control characteristics of a fighter airplane in inverted flight attitude as determined by model tests. Aug 1945. 31p photos, drawings, graphs Mi $2.25 Ph $5.00

Tests have been made in the Langley free-flight tunnel to compare the stability and control characteristics of a powered airplane model in the erect and in the inverted flight attitudes. Force tests and yaw-trim tests were made to determine the static stability characteristics of the model and power-off flight tests were made to determine the general flight characteristics of the model in the inverted attitude. The results of the tests showed that with zero thrust the longitudinal and directional stability was almost the same in the inverted flight attitude as in the erect attitude. With power on, however, a serious reduction in both longitudinal and directional stability occurred in inverted flight. The effective dihedral was reversed in the inverted flight attitude. NACA L-15.

PB 94260

Pearson, E. C., Jr. and others.

Effects of compressibility on the maximum lift characteristics and spanwise load distribution of a 12-foot-span fighter-type wing of NACA 230-series airfoil sections. Nov 1945. 28p photos, drawings, tables Mi $2.00 Ph $3.75

Force and pressure-distribution measurements were made on a fighter-type wing model of conventional NACA 230-series airfoil sections in the Langley 16-foot high-speed tunnel to determine the effects of compressibility on the maximum lift characteristics and the span-wise load distribution. The range of angle of attack investigated was from -10° to 24°. The Mach number range was from 0.20 to 0.70 at small and medium angles of attack and from 0.15 to 0.625 at very large angles of attack. In the Mach number range from 0.15 to 0.55, the maximum lift coefficient first increased with increasing Mach number and then decreased rapidly after having numbers higher than 0.55, the rate of decrease of maximum lift coefficient with Mach number was considerably reduced. At these higher speeds the lift coefficient continued to increase with angle of attack well beyond the angle at which marked flow separation or stalling occurred, and the maximum lift coefficient was reached at angles 10° to 12° beyond the stalling angle. No significant changes in the span load distribution were found to occur below the stall at any of the test speeds. When the wing stalled at high speeds, the resultant load underwent a moderate outboard shift, which resulted in increases in root bending moment up to about 10 percent. NACA L-51.

PB 94468

Pearson, Henry A. and Aiken, William S.

Analysis of effect of rolling pull-outs on wing and aileron loads of a fighter airplane. Mar 1946. 80p drawings, graphs, tables Mi $3.50 Ph $10.00

An analysis was made to determine the effect of rolling pull-outs on the wing and aileron loads of a typical fighter airplane. The origin and magnitudes of the loads, shears, bending moments, and torques were determined for rolling pull-outs at six selected points on the V-n diagram. The results obtained indicated that higher loads are imposed upon the wings and ailerons by the rolling pull-out than would be imposed by application of the loading requirements for which the airplane was designed. An increase in wing weight of 102 pounds, or about 15 percent, was found to be required if the wing were designed for a rolling pull-out instead of the usual symmetrical

maneuver. The analysis of the aileron loads indicated that although the aileron was structurally able to carry the maximum computed loads, the requirements for which the aileron was originally designed were found to be inadequate. NACA L-270.

PB 94399

Pearson, Henry A. and Aiken, William S., Jr.

Charts for the determination of wing torsional stiffness required for specified rolling characteristics or aileron reversal speed. Dec 1944. 33p drawings, graphs Mi $2.25 Ph $5.00

A series of charts are presented by which the wing torsional stiffness required to meet a given standard of rolling effectiveness may be quickly determined. The charts may also be used to obtain quickly the aileron reversal speed and the variation of the loss in rolling effectiveness with airspeed. The charts apply to linearly tapered wings and elliptical wings of tubular-shell construction having various aspect ratios with aileron span and location of ailerons as variables. In the derivation of the charts, induced lift effects have been taken into account and the form of the wing-torsional-stiffness curve has been assumed. NACA L-187.

PB 94280

Peiser, A. M. and Wilkerson, M.

Method of analysis of V-G records from transport operations. Nov 1945. 22p graphs, tables Mi $2.00 Ph $3.75

A method has been developed for interpreting V-G records taken during the course of commercial transport operation. This method involves the utilization of fairly simple statistical procedures to obtain "flight envelopes", which predict that, on the average, in a stated number of flight hours, one value of airspeed will exceed the envelope and one positive and one negative acceleration increment will exceed the envelope with equal probability of being experienced at any airspeed. Comparison with the actual data obtained from various airplanes and from various airlines indicates that these envelopes predict the occurrences of large values of acceleration and airspeed with a high degree of accuracy. NACA L-71.

PB 94432

Pepcon, Philip W.

Free-spinning-tunnel tests of a model of a canard airplane. May 1943. 10p photos, diagrs, drawings Mi $1.25 Ph $1.25

A series of tests was made in the NACA 15-foot free-spinning tunnel to study the spin characteristics of a 1/24-scale model of a hypothetical canard airplane, which was designed to be the same size and to have the same general aerodynamic characteristics as a Boeing B-247 airplane. The model had a single fin and rudder at the rear of the fuselage. The model spun normally and had excellent recovery characteristics. Moderate variations in mass distribution, center-of-gravity location, or changes in horizontal or vertical control surfaces had only moderate effects upon the recovery characteristics of the model. A few spins were very oscillatory. NACA L-222.

PB 94337

Phillips, William H.

Application of spring tabs to elevator controls. Oct 1944. 30p drawing, graph, tables Mi $2.00 Ph $3.75

Equations are presented for calculating the stick-force characteristics obtained with a spring-tab type of elevator control. The main problems encountered in the design of a satisfactory elevator spring tab are to provide stick forces in the desired range, to maintain the force per g sufficiently constant throughout the speed range, to avoid undesirable "feel" of the control in ground handling, and to prevent flutter. Examples are presented to show the design features of spring tabs required to solve these problems for airplanes of various sizes. It appears possible to provide satisfactory elevator control-force characteristics over a large center-of-gravity range on airplanes weighing from about 16,000 to 300,000 pounds. On airplanes weighing less than 16,000 pounds, some difficulty may be encountered in obtaining sufficiently heavy stick forces for rapid movements of the control stick. Some special tab designs, including geared and preloaded spring tabs, are discussed. The geared spring tab is shown to offer a means of obtaining satisfactory ground control without introducing excessive variation of force per g with speed. By the use of spring tabs on elevators, the control forces may be made more closely predictable and the variation of stick-force characteristics among different airplanes of the same type may be greatly reduced. One of the principal objections to the use of spring tabs is the amount of weight required for mass balance to prevent flutter. NACA L-122.

PB 94300

Phillips, W. H. and others.

Effect of lateral shift of center of gravity on rudder deflection required for trim. Nov 1944. 9p photo, graphs Mi $1.25 Ph $1.25

Tests of a single-engine scout-bomber airplane showed that the rudder deflection required for trim at low speed in the critical wave-off condition may be reduced approximately 10° by a lateral shift of the center of gravity equal to 1.8 percent of the wing span. The reduction in rudder deflection required for trim consists of the rudder deflection required to offset yawing moments from the ailerons and from the component of the weight in the direction of the longitudinal axis and the rudder deflection required to hold the sideslip angle necessary to maintain straight flight. The effect of the lateral loading must be taken into account in tests to determine the adequacy of the rudder for trim. The lateral center-of-gravity location is also important in the service operation of airplanes because, by suitable

distribution of the useful load in the wings, the ability of the rudder to trim the airplane in critical power-on conditions may be markedly improved. NACA L-92.

PB 94237

Phillips, W. H.

Stability of a body stabilized by fins and suspended from an airplane. Apr 1944. 30p drawing, graphs, table Mi $2.00 Ph $3.75

A theoretical investigation has been made of the oscillations performed by suspended bodies of the type commonly used for trailing airspeed heads and similar towed devices. The primary purpose of the investigation was to design an instrument that will remain stable as it is drawn up to a support underneath an airplane without attention on the part of the pilot. Flight tests of a model airspeed head were made to supplement the theoretical study. Unstable oscillations of the body at short cable lengths were predicted by the theory, but the rate of increase of amplitude of these oscillations was very small. In flight tests, more violent types of instability were believed to be caused by unsteady or nonuniform air flow in the region where the cable was lowered from the airplane. No practical method was found to provide large damping of the oscillations at short cable lengths, but the degree of stability present in a suitably designed suspended body was shown to be satisfactory if the body was lowered into a uniform air stream. NACA L-28.

PB 94239

Phillips, William H.

Use of geared spring tabs for elevator control. Feb 1945. 25p drawings, graphs, tables Mi $2.00 Ph $3.75

Equations are presented for the stick force per g in maneuvers obtained with a geared spring tab. A geared spring tab, as defined herein, differs from an ordinary spring tab in that, when the elevator is moved with the stick free at zero airspeed, the tab moves with respect to the elevator in the same manner as a conventional geared, or balancing, tab. The geared spring tab is shown to present the theoretical possibility of obtaining a value of force per g independent of speed regardless of the spring stiffness. If the geared spring tab is used in conjunction with an elevator that has zero variation of hinge moment with angle of attack, the force per g may be made independent of speed at any center-of-gravity location. A suitably designed geared spring tab will provide adequate ground control, small sensitivity of the control forces to slight changes in the elevator hinge-moment parameters, and substantially no variation of stick force per g with speed. The geared spring tab is shown to be most suitable for application to large airplanes. NACA L-30.

—62133

PB 94136

Pinkel, Benjamin and Turner, L. Richard

Flight tests of exhaust-gas jet propulsion. Nov 1940. 24p photos, graphs Mi $2.00 Ph $3.75

Flight tests were conducted on the XP-41 airplane, equipped with a Pratt & Whitney R1830-19, 14-cylinder, air-cooled engine, to determine the increase in flight speed obtainable by the use of individual exhaust stacks directed rearwardly to obtain exhaust-gas thrust. Speed increases up to 18 miles per hour at 20,000 feet altitude were obtained using stacks having an exit area of 3.42 square inches for each cylinder. A slight increase in engine power and decrease in cylinder temperature at a given manifold pressure were obtained with the individual stacks as compared with a collector-ring installation. Exhaust-flame visibility was quite low, particularly in the rich range of fuel-air ratios. NACA E-105.

PB 94376

Pitkin, Marvin and Maggin, Bernard

Analysis of factors affecting net lift increment attainable with trailing-edge split flaps on tailless airplanes. Sep 1944. 39p drawings, graphs, tables Mi $2.25 Ph $5.00

An analysis has been made of factors affecting the net lift increment attainable with trailing-edge split flaps on trailless airplanes. The flaps investigated in the analysis were designed to contribute zero pitching moments about the wing aerodynamic center when deflected. Calculations were made of the lift and pitching-moment characteristics of flaps of this type over a range of design conditions in which sweepback angle, aspect ratio, taper ratio, flap chord, and flap deflection were widely varied. In addition, calculations were made to determine the effect of the various parameters upon the loss in lift incurred in trimming the stability moments of a tailless airplane. A method is given for roughly estimating the maximum lift coefficient of tailless airplanes. The results of the analysis indicated that aspect ratio and sweepback angle were the principal parameters influencing the net lift increment attainable with the flaps on tailless airplanes in trimmed flight. An increase of these parameters allowed the use of large-span flaps. Large values of both parameters were required to obtain sizable lift increments and to minimize the loss of lift caused by the longitudinal control surfaces. In order to utilize fully the high-lift advantages associated with flaps on swept-back wings, the use of tip slots or washout will probably be required to eliminate the undesirable tip stalling and the accompanying stability losses caused by large angles of sweepback. The allowable flap span—and hence the net lift increase—of some wing configurations could be further increased by the addition of

a trim flap located at the wing tips and deflected upward. Excessive wing taper was shown to reduce the net lift increment obtainable from flap systems, whereas increased flap chord and deflection increased the net lift increment. NACA L-164.

PB 94403

Pitkin, Marvin and others.

Influence of vertical-tail design and direction of propeller rotation on trim characteristics of a twin-engine-airplane model with one engine inoperative. Feb 1945. 50p photos, drawings, graphs, tables Mi $2.50 Ph $6.25

Tests have been made in the Langley free-flight tunnel to determine the influence of mode of propeller rotation and vertical-tail design upon the trim characteristics of a model of a twin-engine airplane with one engine inoperative. The test model was mounted on a trim stand, which allowed freedom in roll and yaw under conditions simulating those required by the NACA and the Army Air Forces for asymmetric-power operation in flight. The seven vertical-tail designs tested included three tails of low aspect ratio and of different area, one twin tail of low aspect ratio, two tails of high aspect ratio and with different rudder areas, and one all-movable tail of high aspect ratio equipped with a linked tab. All tests were made with the flaps down. The tests showed that the effect of mode of propeller rotation upon the directional trim characteristics of the model operating with asymmetric power was considerable. Propeller rotation in which the upper tips rotate outboard toward the wing tip (outboard rotation) generally created more severe out-of-trim conditions than inboard rotation. The all-movable tail design was found to be more effective than the other designs tested in nullifying the effects of asymmetric power. The conventional tail designs with high aspect ratio were more effective than the designs with low aspect ratio in this respect. The single vertical tails were generally more effective in trimming the yawing moments created by asymmetric power than twin vertical tails of the same aspect ratio and equal area, particularly when the rudder was free. At small angles of sideslip, however, the moments caused by asymmetric power were more readily trimmed by deflecting the rudders of the twin tails than by deflecting the rudder of a single tail. The trimming effectiveness of the vertical tail increased almost directly with vertical-tail area but increased at a decreasing rate with rudder deflection and chord. When the rudder was free, the addition of dorsal- and ventral-fin areas permitted increases in the asymmetric power balanced by the tail surface at moderate angles of sideslip. NACA L-191.

PB 94213

Pitkin, Marvin and Schade, Robert O.

Tests of a linked differential flap system designed to minimize the reduction in effective dihedral caused by power. Aug 1945. 44p drawings, graphs, tables Mi $2.50 Ph $6.25

An investigation has been made in the Langley free-flight tunnel to determine experimentally the effects of a linked differential flap system upon the effective-dihedral characteristics of a 1/10-scale powered airplane model. The differential flap system consisted of two individual flaps so linked as to operate differentially from an initial setting when free and designed to create rolling moments automatically opposing those created by slip-stream effects. Tests were made on the Langley free-flight-tunnel balance and on a trim stand that permitted freedom in roll and yaw. The results of the tests indicate that the negative dihedral changes caused by power may be materially reduced or completely eliminated by use of a differential flap system. Increasing the flap-differential ratio (ratio of upgoing flap deflection to down-going flap deflection) to a value above unity increased the effectiveness of the differential flap system in opposing the dihedral changes caused by power but diminished the tendency of the flaps to restore themselves to their initial setting of equal deflection. Little effect was observed when the flap-differential ratio was decreased to a value below unity. Differential flap action also increased the static directional stability. NACA L-4.

PB 94423

Purser, Paul E. and Campbell, John P.

Experimental verification of a simplified vee-tail theory and analysis of available data on complete models with vee tails. Jan 1945. 60p drawings, graphs, tables Mi $2.75 Ph $7.50

An analysis has been made of available data on vee-tail surfaces. Previously published theoretical studies of vee tails have been extended to include the control effectiveness and control forces in addition to the stability. Tests of two isolated tail surfaces with various amounts of dihedral provided a check of the theory. Methods of designing vee tails were also developed and are given in the present paper. The analysis indicated that a vee tail designed to provide values of stability and control parameters equal to those provided by a conventional tail would probably provide no reduction in area unless the conventional vertical tail is in a bad canopy wake or unless the vee tail has a higher effective aspect ratio than the conventional vertical and horizontal tails. The analysis also indicated that a possible reduction in control forces (or in the amount of control balance required) can be made by the use of a vee tail, provided large deflections of the control surface do not cause a large decrease in the effectiveness and increase in hinge-moment coefficient per degree deflection of the control surface. If large-chord control surfaces must be used in order to keep the control deflections small, the control forces (or the amount of control balance required) on the vee tail are likely to be equal to

or greater than those for the conventional tail assembly. The analysis further indicated that the vee tail could have the following advantages over the conventional tail assembly: (1) Less drag because the vee tail has fewer fuselage-tail junctures. (2) Less tendency toward rudder lock. (3) Higher location of tail surfaces, which tends to reduce elevator deflection required for take-off and landing, to keep the tail out of spray in flying-boat take-off, and to reduce possibilities of tail buffeting from the wing and canopy wakes in high-speed flight. (4) Fewer tail surfaces to manufacture. On the other hand, the analysis indicated the following disadvantages that a vee tail might have when compared with conventional tails: (1) Possible interaction of elevator and rudder control forces. (2) Possible interaction of elevator and rudder trimming when tabs are at fairly large deflections. (3) More complicated operating mechanism. (4) Greater loads on tail and fuselage, which would tend to require increased weight. The tests of the isolated vee tail indicated that the simplified theory developed for vee tails was valid for dihedral angles up to about 40°. The relative merits of the vee tail and conventional tails for spin recovery have not been established, but it appears that the vee tail should be at least as good as the conventional tail assembly in this respect, except possibly in cases in which simultaneous full deflection of both rudder and elevator is required for recovery from the spin. NACA L-212.

PB 94462

Purser, Paul E. and Toll, Thomas A.

Wind-tunnel investigation of the characteristics of blunt-nose ailerons on a tapered wing. Feb 1943. 70p drawings, graphs, tables Mi $3.00 Ph $8.75

An investigation has been made in the LMAL 7- by 10-foot tunnel of various modifications of a 0.155-chord blunt-nose aileron on a semispan model of the tapered wing of a fighter airplane. The modifications considered included various amounts of overhanging nose balance with various nose radii. The effects of the vertical location of the aileron hinge axis were determined for one balance size and the effects of the gap at the aileron nose were determined for all the modifications. Peak pressures were determined over the nose portions of some of the ailerons. The stick forces and the rates of roll were estimated for a fighter airplane with plain sealed ailerons and with some of the blunt-nose ailerons. The results of the tests and computations indicated that, for the arrangement tested, the use of blunt-nose ailerons with 40-percent balance would reduce the high-speed stick forces to a very small value. The adverse effects of a gap at the aileron nose tended to decrease as the chord of the balance was increased. The effects of the vertical location of the hinge for the aileron with 40-percent balance were small. The effects of increasing the nose radii on the blunt-nose ailerons was, in general, to increase the negative slope of the curves of hinge-moment plotted against aileron deflection, to decrease the rolling-moment coefficients of small aileron deflections, to increase the effective deflection range of the aileron, and to decrease the magnitude of the peak pressures over the aileron nose. The magnitude of the peak pressures indicates that severe compressibility effects would probably be encountered if the ailerons were deflected ± 15° while the airplane was flying at a moderately high speed. Accordingly, it appears that blunt-nose ailerons should be tested at Mach numbers considerably higher than the Mach number of the test data herein presented before being considered for use on high-speed airplanes. NACA L-262.

PB 94247

Putnam, Abbott A.

Analysis of life expectancy of airplane wings in normal cruising flight. Jul 1945. 28p graphs Mi $2.00 Ph $3.75

In order to provide a basis for judging the relative importance of wing failure by fatigue and by single intense gusts, an analysis of wing life for normal cruising flight was made based on data on the frequency of atmospheric gusts. The independent variables considered in the analysis included stress-concentration factor, stress-load relation, wing loading, design and cruising speeds, design gust velocity, and airplane size. Several methods for estimating fatigue life from gust frequencies are discussed. The procedure selected for the analysis is believed to be simple and reasonably accurate, though slightly conservative. The results of the analysis indicate that, in general, the fatigue life and single-gust life of an airplane wing are of about equal importance for conventional designs and normal operating conditions. The fatigue life appears to be influenced mainly by the detail design and construction and not greatly by normal changes in operating speed or by moderate changes in the design gust velocity. Single-gust life, however, is not appreciably affected by the detail design and construction but is markedly affected by operating speed and by changes in design gust velocity. The trends in design toward higher wing loading, reduced load factor, larger size, and increased speed appear to have a small effect on both fatigue life and single-gust life. NACA L-35.

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